WORKING PLAN

FOR THE

NILAMBUR HILLS

1937-38 TO 1947-48

PREPARED BY
R. S. BROWNE, Esq., I.F.S.
Deputy Conservator of Forests

MADRAS
PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS

1936

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INTRODUCTION.

THE origin of a Working Plan for the Nilambur Hills lay in the hope entertained by Mr. J. Kenneth Pearce, late Logging Engineer, Madras, that wholesale logging of the hill forests would be practicable, and would be permitted, and that the Government Saw-Mill would be moved from Olavakode, and used to convert the timber.

With this object in view, nearly 20,000 acres of the hill forests were surveyed and enumerated, between 1926 and 1929, at a cost of over 1 lakh of rupees.

A reference to paragraph 323 of the Revised Working Plan for the Nilambur valley (1928–29 to 1937–38) will show that even before the completion of the enumerations, the writer of this Working Plan (who also wrote the last Working Plan for the valley) entered a *caveat* with regard to heavy fellings in the hills.

Towards the end of 1929 the writer was given the survey and enumeration records of the Logging Engineer, with instructions to make a Working Plan. Mr. R. D. Richmond, C.I.E., who was then Chief Conservator of Forests, decided that only selection fellings were permissible. General instructions regarding preparation of the Working Plan were issued by him, in 1929, and have been followed, except where subsequent experience of the tract have indicated alterations. Such alterations have been sanctioned by the Chief Conservator for the time being.

Except for one month in 1932, when he was attached to the Working Plans Circle, the writer has had to prepare this Working Plan in addition to his ordinary duties as a District Forest Officer, firstly of Nilambur and latterly of the Nilgiris. Both are very heavy districts, which explains the unconscionable time he has taken in submitting the plan.

Although made by a District Forest Officer the Working Plan has been prepared in consultation with the Conservator of Forests, Working Plans Circle.

The Working Plan Officer takes no responsibility for the area and enumeration data appearing in this report, since the figures were compiled by the staff of the Logging Engineer. The field work for the preparation of the Working Plan was done between 1929 and 1932, while the writer was District Forest Officer, Nilambur, and he is grateful for the assistance of Khan Sahib K. Kunhirayan Sahib (Range Officer, Amarampalam) and his subordinates. He also wishes to thank Mr. S. Riazuddin, Extra Assistant Conservator of Forests, who helped to analyse the " Cruise-sheets " of a few of the blocks, and Mr. M. S. Rangaswamy, Extra Assistant Conservator of Forests, who aligned one of the proposed roads; also Mr. J. M. Sweet, who succeeded him as District Forest Officer, Nilambur, and who has promptly supplied any figures for which he was asked.

R. S. BROWNE,
Working Plans Officer, Nilambur
and
District Forest Officer, the Nilgiris.

OOTACAMUND,

29*th November* 1935.

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Working Plan for the Nilambur Hills.

PART I.

Summary of Facts on which the proposals are made.

CHAPTER I.—THE TRACT DEALT WITH.

SECTION 1.—NAME AND SITUATION.

1. *Name.*—The tract dealt with consists of the portion of the new Amarampalam Reserved Forest described in the Working Plan for the Nilambur Valley as the 'Inaccessible Working Circle.'

2. *Situation.*—The tract is a compact block of forest lying in the east of the Amarampalam Range of the Nilambur Division, in the Ernad taluk of Malabar. The forests in which work is prescribed lie in the watersheds of the Karumpuzha and the Thalipuzha.

SECTION 2.—CONFIGURATION OF THE GROUND.

3. *Elevation.*—The elevation of the tract, above mean sea level, varies from 250 feet to 8,300 feet.

4. *Configuration.*—The area is on the outer face of the Nilgiris. Small portions of the foothills contain gently sloping ground, but the bulk of the area covered by this Working Plan is on very steep slopes. There is a great deal of sheer precipice at the edge of the Nilgiri plateau. Where the upper areas are not precipitous, they consist of steeply sloping spurs, separated by deep ravines. So difficult is the upper part of this tract that only two routes have as yet been found by which it is possible to walk to the top of the Nilgiris, and to make this ascent it is necessary, in many places, to use one's hands almost as much as one's feet. The lower ground also, from about 4,000 feet downwards, consists largely of steep spurs, with ravines or streams between them. Areas with a moderate or gentle slope towards the main rivers are of inconsiderable extent, even below 1,000 feet elevation. The configuration of the ground is, for two reasons, the ruling factor in deciding the extent to which the forests can be exploited. In the first place the primary function of these forests is to prevent the erosion of the slopes, and to protect and regulate the water-supply. In the second place the rugged and broken character of the country limits the possibility of extracting timber and makes the construction of export routes extremely expensive.

5. *Aspect.*—The country is so broken that all aspects are represented. The ruling aspect is Western.

6. *Rivers and Streams.*—There are two main rivers, the Karumpuzha and the Thalipuzha, which meet near Pulimunda, close to the western boundary of the tract. The Karumpuzha is the bigger of the two, and has three large tributaries, namely, the Maiyakallanpuzha, the Arickayampuzha and the Panapuzha. The Thalipuzha has only one big tributary—the Chinnathalipuzha. All the above rivers and streams are perennial. They are fed by innumerable smaller streams, of which some are perennial, but many are dry in the hot weather.

SECTION 3.—GEOLOGY, ROCK AND SOIL.

7. *Rock.*—Gneiss is the predominating rock in the tract. Outcrops of rock are very common, and in the upper hills there are very extensive areas of solid rock with no soil covering whatever. Foliation of the gneiss rock is more common at the lower than at the higher elevations, and in parts of the foothills the foliated gneiss has changed, or is changing, into laterite. Intrusive veins of quartz are common.

8. *Soil.*—The most common soil is a loam resulting from the disintegration of the gneiss rock. Disintegrated laterite is also found, but is not common, since there is comparatively little laterite rock in the tract. There is very little of the river alluvium which is found along the main streams of the plains of Malabar. The depth of the soil varies greatly, and depends, to a large extent, on the degree of success with which

forest growth has held up the hill-sides. Landslides are frequently seen. Surface boulders (usually of gneiss, sometimes of quartz) are characteristic, in a great part of the tract. This feature is more pronounced on southern and western than on the other aspects, and there are many places in the evergreen forest where the soil is almost completely covered by boulders. Since there is so little level ground, the drainage of the soil is usually good. Swampy areas are sometimes found beside streams, or on slopes where there is an impermeable pan, or rock near the surface.

9. *Humus.*—In the deciduous forests, and especially on the northern and eastern aspects, there is a fairly good humus layer, except where tree cover is insufficient. In the evergreens, wherever the canopy is complete, the soil is rich in humus.

SECTION 4—CLIMATE.

10. *Temperature.*—No records of temperature are available. The deciduous forests are hot from February to May, though it is unlikely that the temperature ever exceeds about 100° Fahrenheit, and it is usually somewhere between 80° and 90° by day, in these months; it is less in September to January, and still less during the south-west monsoon. The heat is the humid heat of the West Coast. Owing to the unbroken mass of forest, and to the proximity of high hills, the difference between day and night temperature is more marked than in the plains of Malabar. The evergreen forests are always pleasantly cool by way, though the air is humid. The nights are cold. At the tops of the Nilgiris, frost is experienced between November and February.

11. *Rainfall.*—There is no rainfall measuring station in the tract. The average annual rainfall at Nilambur is about 125 inches, but it is undoubtedly somewhat heavier in the foothills, and very considerably heavier on the face of the ghauts. Most of the rain falls during the south-west monsoon, that is, between early June and early September. The north-east monsoon is very variable, but it always gives some rain in the foothills in October and November, while on the ghauts there is heavy rain, at intervals during these months. December and January are usually rainless throughout the area. In February there are occasional showers at higher elevations, but these showers seldom commence in the foothills until March. Showers associated with thunderstorms are frequent in April and May, especially in the upper areas.

12. *Wind.*—From April to September the prevailing wind is from the south-west. From November to January it is from the north-east. At other times the wind is variable. Gales are experienced during the months of April, May, June, July and October.

13. *Unhealthiness.*—The months of December, January and February are comparatively healthy. The experience of those who have camped in the forests has been that September to November and March to May are extremely malarial, and the health of plainsmen is made still worse by chills, due to a colder climate than that to which they are accustomed. There was a great deal of sickness, and a number of deaths, amongst the coolies engaged in sleeper operations in 1930. There is probably little risk of malarial infection during the south-west monsoon, but at this time the forests are scarcely fit for plainsmen, owing to the heavy rain and unusual cold, and the prevalence of leeches.

SECTION 5—WATER-SUPPLY.

14. *Water-supply.*—Below 4,000 feet there are sufficient perennial streams to allow of camps being made within reasonable distance of any work which is likely to be undertaken in the forests. To get to higher elevations one usually has to follow the spurs, where it is often difficult to find water.

SECTION 6—DISTRIBUTION AND AREA.

15. *Distribution and area.*—The tract covered by this working plan is a compact block of 48,159 acres in the east of the New Amarampalam Reserved Forest. It forms part of the Amarampalam range of the Nilambur district. The headquarters of the range are at Karulai, which is some six miles from the nearest part of the tract dealt with.

SECTION 7—STATE OF THE BOUNDARIES.

16. *Natural boundaries.*—The Korampuzha and the Udahallapuzha each bounds the tract for a few miles, in the north-west and south-west respectively, separating it from private forests.

17. *Artificial boundaries.*—The bulk of the outer boundary is artificial, and consists of stone cairns at most salient points. A great deal of the line is inaccessible from the Nilambur side and some of it (e.g., Nilgiri peak) is completely inaccessible from all directions. Such cairns on the Nilgiri-Malabar boundary as are reasonably accessible are

maintained by the Nilgiri division. The artificial boundary between the working plan area and private forest is, for the most part, so difficult of access that nothing is done to maintain it; in such places the area consists either of grass lands and sheet rock of no value, or of forest which cannot possibly be exploited. The boundary between this working plan area and the Conversion Working Circle of the Nilambur Valley is shown on the map. It has not been marked on the ground, nor does this seem necessary.

SECTION 8—LEGAL POSITION.

18. *Legal position.*—The Amarampalam reserve (of which the area covered by this working plan forms a part) was purchased by Government in public auction on the 19th December 1887, from the Edavanna Kovilagom, and confirmed by the court on the 20th Febuary 1888, for Rs. 42,000. The whole tract dealt with is therefore in the absolute possession of the State. The Amarampalam Reserved Forest was notified under section 16 of the Madras Forest Act V of 1882 in Notification No. 466, dated 25th October 1898.

19. *Closure to grazing.*—On the 2nd July 1911, a notification was issued under section 26 (*e*) of the Madras Forest Act, V of 1882 closing all forests in the South Malabar division to grazing. This working plan area is therefore closed to grazing.

SECTION 9—RIGHTS AND CONCESSIONS.

20. *Rights.*—There are no rights in the tract dealt with.

21. *Concessions.*—A concessional payment of cloth, rice and spirit to the value of Rs. 5 is paid to the headman of the Naickens, a jungle tribe who live near Mundakadavu in the New Amarampalam Reserve, on the capture of any elephant in the reserve. No other concessions have been in practice.

CHAPTER II.—THE FOREST.

SECTION 1—COMPOSITION AND CONDITION OF THE CROP.

22. *Semi-deciduous forests.*—There is, naturally, no clearly defined line between the semi-deciduous forests of the foothills, and the evergreen forests of the higher elevations, but the two types merge, one into the other, at an average elevation of about 1,500 feet above sea-level. The bulk of the semi-deciduous forest is of one type, viz., mixed, uneven-aged, high forest. The only other distinct type is where bamboo (which is frequently found mixed with the main type of timber forest) has established itself almost to the exclusion of tree-growth, e.g., on the left bank of the Thalipuzha immediately above its junction with the Karumpuzha. The bamboo referred to is mostly *Bambusa arundinacea*, though *Dendrocalamus strictus* is found in a few places. Generally speaking, the semi-deciduous timber forest is of very fine growth. There is, however, a marked deficiency in the younger age classes, especially the class of seedling and sapling. This deficiency is thought to be due to the comparative immunity from fire which the forest has enjoyed subsequent to reservation, which has encouraged an undergrowth inimical to the natural regeneration of tree species. *Xylia xylocarpa* is the only valuable species whose condition can be considered satisfactory as regards regeneration and pole growth. The following are the commonest tree species in the semi-deciduous forests :—

> *Terminalia paniculata*, *Xylia xylocarpa*, *Lagerstrœmia microcarpa*, *Terminalia tomentosa*, *Stereospermum chelonoides*, *Terminalia belerica*, *Bombax malabaricum* and *Tetrameles nudiflora*. Teak, rosewood, *Artocarpus hirsuta* and *Pterocarpus marsupium* are found in the semi-deciduous type, but unfortunately these superior timbers are not present in great quantity. Fuller details of species are given in Part II, when discussing the enumeration of the crop.

23. *Evergreen forests below 4,000 feet elevation.*—The evergreen forests, from about 1,500 to 4,000 feet elevation, are a very fine example of the tropical " rain " forest type, probably the finest, in the way of height and volume, in Southern India. In this magnificient forest it is probably fortunate that the bulk of the species are, owing to difficulty of extraction and remoteness from the market, unsaleable at a profit. Otherwise, the temptation to sacrifice the real value of the forest (i.e., protection) in favour of immediate monetary gain, might easily prove irresistible. The necessity of working this forest conservatively, as a water-catchment area, and as a regulator of stream-flow, cannot be overemphasized. It was mapped and enumerated at great expense, with the idea of wholesale fellings. Fortunately saner counsels have now prevailed (and, incidentally they were *not* influenced by the dull state of the timber market) but there is always the possibility of temptation recurring. Now that the resources of the forest are roughly known, conditions similar to those of the Great War of 1914–18, might, in the future, tempt the

management to embark on concentrated fellings. The result to the country-side in the plains of the Ernad taluk would be disastrous. The main headwaters of the Beypore river must be protected by the indigenous evergreen forest, for all time. The unprecedented floods of 1924 were due to an unusually severe monsoon; but for the protection afforded by the evergreen forests of the tract now dealt with, such floods would undoubtedly be an annual occurrence. In the evergreen zone of 1,500 to 4,000 feet elevation, by far the commonest species is *Palaquium ellipticum*. Next comes *Cullenia excelsa*, followed by *Calophyllum tomentosum* (*syn. elatum*). Other very common species in this zone are given in order, as follows :—*Terminalia belerica, Eugenia gardneri, Bischofia javanica*, a species of *Hopea* (possibly *Odorata*) *Machilus macrantha, Elæcarpus tuberculatus, Lagerstrœmia microcarpa, Dysoxylum malabaricum* and *Cedrela toona*. Compared with the above species, sleeper woods are relatively rare. *Hopea parviflora* is found, scattered, up to about 2,500 feet elevation. *Mesua ferrea* is fairly abundant from about 3,000 to 4,000 feet, but it is probably not so common as one would gather from the enumeration data, owing to the probability of inexperienced " cruisers " having mistaken *Cullenia excelsa* for this species. Fuller details of the species found during enumeration are given in Part II. In this evergreen zone, all age classes are well represented. Natural regeneration is generally prolific, except in places where *Strobilanthes* interferes. The finest tree growth is usually to be found on the flanks of the ridges. The neighbourhood of ravines, being more subject to periodical landslides, is frequently given over to almost pure reeds and canes.

24. *Evergreen forests between* 4,000 *and* 5,000 *feet elevation.*—The forest between 4,000 and 5,000 feet is still of the large type, though not nearly so fine as the lower evergreens. The commonest species are *Palaquium ellipticum, Cullenia excelsa, Mesua ferrea* and species of *Elæocarpus*. In this zone, *Mesua ferrea,* though plentiful, tends to become stunted. A small bamboo, *Teinostachyum wightii*, is common at this altitude.

25. *Evergreen forests above* 5,000 *feet elevation.*—Above 5,000 feet the forest is small, and becomes quite stunted above 6,000 feet, where it is interrupted by stretches of grasslands. *Eugenia* spp. and *Rhododendron nilagiricum* appear to be the most common trees in the higher evergreen zone. A small bamboo with whorled branchlets (probably *Oxytenanthera thwaitesii*) is also very common. There is a great deal of slab rock and precipice in this zone. The precipitous nature of the upper part of this tract can be gathered from the fact that only two possible ways are known, by which one can climb up to the Nilgiri plateau, and both of them are extremely difficult. In 1932 the writer, accompanied by Mr. E. S. Dawson, Forest Engineer, and Lieutenant Cave of the Somerset Light Infantry, climbed up by the Nilgiri Peak route. From a camp on the right bank of the Thalipuzha, at about 4,000 feet, they reached the ridge overlooking the Ochterloney Valley in about six hours, and thence walked in to Ootacamund. They reached the summit at a point between Nilgiri Peak and Yellamalai, but nearer to the latter. In 1934 Messrs. A. F. Minchin and J. M. Sweet found another way up. Starting from Meenmutti Serambi on the Karumpuzha (2,000 feet) they climbed up to and round the western shoulder of Yerukalmalai, thence up the ridge just to the north of Vallakattam, and finished on the comparatively gentle slope running northwards to Mukerti Peak. They spent a night on the way up in the neighbourhood of Yerakalmalai, and returned to this camp after finishing their climb, and thence down to Meenmutti the next day. This route is probably the less difficult of the two, since Messrs. Minchin and Sweet were able to go down the way they came up. (It would have taken a great deal to persuade the Nilgiri Peak party to undertake the descent by the route they used to climb up.)

SECTION 2 —INJURIES TO WHICH THE CROP IS LIABLE.

26. *Wind.*—Violent storms occur at intervals during the hot weather which precedes the south-west monsoon. Most of the damage by wind occurs at this time, but such injury is not extensive.

27. *Lightning.*—One finds scattered examples of trees killed by lightning, but the damage done is negligible.

28. *Landslides.*—In this mountainous tract, subjected to an extremely heavy south-west monsoon, landslides are inevitable. But their extent has been strictly limited, in the past, by conservation of tree growth, and the working of the future must be so regulated as to maintain the protective character of the forest in this important catchment area.

29. *Fire.*—As the tract is practically uninhabited, forest fires are very rare. Grass fires, on both sides of the Nilgiri-Malabar boundary, are, however, frequent. There is little apparent effect of one such grass fire. But their cumulative effect is to cause the upper limits of the sholas to recede, gradually, downhill.

30. *Weeds and climbers.*—Natural regeneration in the evergreen forest is impeded in many places by reeds and by Strobilanthes. In the deciduous forests, gregarious patches

of bamboo are the main obstacle to natural regeneration of trees; rank growth of grass is also found, in places. Climbers are common both in the deciduous and the evergreen forests, and are responsible for a considerable amount of damage to the growth of trees.

31. *Insects.*—Experience of this tract is too limited to say what insect pests are present. In the deciduous area it is common to find teak trees which have been defoliated by the caterpillars of *Hyblœa puera* and *Hapalia machœralis.*

32. *Animals.*—Elephants are numerous, both in the deciduous and in the evergreen forests, and they do the usual damage to tree growth. In a vast mixed forest like this, the damage done by elephants is scarcely noticeable, but their presence would be a serious obstacle to the planting of small clearings. Bison, sambhur and pig are also numerous, but appear to do little damage. Rodents will probably give some trouble when edible seeds, such as *Artocarpus hirsuta,* are sown in the tract.

33. *Man.*—The tract is too remote to be subject to theft of timber, and being, moreover, practically uninhabited, injury to the forests by man is negligible. Theft of minor produce took place in the years in which no leases were given by the department. But as long as the right to collect minor produce is leased annually, the lessee sees to it that there is no illicit collection to speak of.

CHAPTER III.—UTILIZATION OF THE PRODUCE.

SECTION 1.—AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION.

34. *The local population.*—The tract dealt with is uninhabited, except for a small hill tribe known as the " Shola Naickens " who live in the forest, and move from place to place, without fixed abode. In the dry weather they usually find shelter in caves and under overhanging rocks in the river-beds. In the rains they make shelters for themselves in trees. Their total number probably does not exceed 50 souls.

35. *Wants of the Shola Naickens.*—These hill people live mainly on roots, honey and fruits. They have never been known to come to Nilambur, nor even as near civilization as Nedungayam. But they maintain some sort of touch with the outer world, mainly through the agency of the contractors for canes and minor produce, who pay them in kind (with rice, cloths, etc.) in return for handing over the produce they collect. Their wants are extremely simple, and if asked what they wanted they would probably suggest that they be left in peace!

SECTION 2.—MARKETS AND MARKETABLE PRODUCTS.

36. *Markets.*—Railway sleepers are taken over by the South Indian Railway at Nilambur. Other forms of timber and poles, when extracted, go to Kallai. Most of the minor produce goes to Calicut for sale. Canes go mainly to Tellicherry and Mahé. Should the working of handsawn timber for general purpose develop, it is probable that it will be railed from Nilambur to markets in the Central and Eastern districts.

37. *Marketable products.*—From the old stumps that one sometimes finds in the semi-deciduous forests, it is probable that some of the best teak and rosewood in the less remote places were worked while the forests were in private ownership, i.e., prior to 1887. Subsequently, the only products found to be marketable were the minor produce (including canes), until in 1930, 1,380 broad gauge and 504 metre gauge sleepers were extracted departmentally and sold to the railways. At the time of writing, an experiment in selling timber and poles, standing, to a contractor, is being tried.

SECTION 3.—LINES OF EXPORT.

38. *Water transport.*—The small quantities of timber and poles, which are now being extracted, are dragged to the Punnapuzha and floated to Kallai. Timber destined for the West Coast market from future fellings will probably be dragged and carted to this river, and to the Karumpuzha near Nedungayam, and floated to the coast. Most of the minor produce is carried to the road at Kanhirakadavu, carted to Mambad or Edavanna, and taken to Calicut in boats.

39. *Road and rail.*—Railway sleepers have been dragged to Mancheri and carted to Nilambur railway station, and this is likely to be the line of export for handsawn timber in the future.

SECTION 4.—METHODS OF EXPLOITATION AND THEIR COST.

40. *Departmental extraction of timber.*—The following railway sleepers were extracted departmentally in 1930–31 :—

Species.	Broad guage.	Metre guage.
Tectona grandis	6	5
Mesua ferrea	299	93
Hopea parviflora	76	19
Xylia xylocarpa	999	387
Totals	1,380	504

The sleepers were sawn at stump site, dragged by coolies to the road near Mancheri and carted to Nilambur railway station. The teak and Xylia sleepers came from the vicinity of Mancheri (i.e., near the western boundary of the tract) and the *Hopea* and *Mesua* sleepers from Gomanmalai, above the Arson Hill inspection hut. A contractor undertook the felling, sawing, dragging and carting of sleepers, and also undertook clamping, spreading for passing, and loading in wagons at Nilambur railway station. For all the above works he was paid at the following inclusive rates :—

Species.	For each passed sleeper.	
	Broad gauge.	Metre gauge.
	RS.	RS.
Mesua and Hopea	6	3
Xylia and teak	4	2

No payment was made for rejected sleepers. The additional expense incurred by the department on construction of sheds, supply of medicines to coolies, enumeration of trees, and other petty items, came to about ten annas per broad gauge unit, so that the rate paid for extracting broad gauge sleepers of *Hopea* and *Mesua* came to about Rs. 6–10–0 each.

41. *Exploitation by purchasers.*—At the time of writing a purchaser is extracting some poles of poon and *Palaquium* and logs of a few other species, selected by him. Minor produce (including canes) is also extracted by purchasers, on lease. Details of the cost of extraction are not available.

SECTION 5.—PAST AND CURRENT PRICES.

42. *Railway sleepers.*—For the sleepers extracted in 1930–31 the prices paid by the Railways are compared, in the following table, with the current prices for sleepers of the same species :—

Species.	Price in 1930–31.		Price n 1934–35.	
	Broad gauge.	Metre gauge.	Broad gauge.	Metre. gauge.
	RS.	RS.	RS.	RS.
Tectona grandis	9½	4	No orders.	
Mesua ferrea	8¼	3	6	2¾
Hopea parviflora	8¼	3	6	2¾
Xylia xylocarpa	8	3	6	2¾
	each.	each.	each.	each.

43. *Logs and poles.*—In July 1934 a contract, which is current until December 1935, was given to one K. M. Mahmud, to select and extract logs and poles in portions of compartment 6, and in another area, to the north of compartment 7, which is not prescribed for working under this working plan. The timber is sold standing, at the following rates :—

Calophyllum tomentosum	4 annas per cubic foot.
Palaquium ellipticum	2 ,,
Artocarpus hirsuta	2½ ,,
Dysoxylum malabaricum	2½ ,,
Terminalia tomentosa	2½ ,,
Lagerstrœmia microcarpa	2½ ,,
Terminalia paniculata	2½ ,,

The minimum girth limit is 3 feet in the middle for *Calophyllum* and *Palaquium*, and 6 feet at breast height for other species. Further not more than 300 trees of *Calophyllum* and *Palaquium* are allowed to be felled under the contract.

44. *Canes.*—Owing to destruction of records in the Malabar rebellion, the results of leasing canes are only known from 1922 onwards. They were leased to purchasers as follows :—

Year.	Revenue derived from the lease.
	RS.
1922–23	1,200
1928–29	1,575
1933–34	550

45. *Minor produce.*—The minor produce lease covers the whole of the Amarampalam Range. It includes the following items :—

Fruits of all kinds, seekai, roots, honey, wax, ginger, dammer and turmeric. The following amounts were paid for recent leases, the period of lease being one year :—

	RS.
1928–29	1,125
1929–30	1,035
1930–31	1,050
1931–32	700
1932–33	500
1933–34	400
1934–35	400

CHAPTER IV.—STAFF AND LABOUR SUPPLY.

SECTION 1.—THE FOREST STAFF.

46. *Staff.*—For the work so far done in the tract dealt with, the staff of the Amarampalam Range, supervised by the District Forest Officer, has been found sufficient, and it is not likely that additional staff will have to be engaged in the near future for the additional work imposed on the Amarampalam Range by this working plan.

SECTION 2.—LABOUR SUPPLY.

47. *Labour.*—For the ordinary works which have been done in this tract (e.g., clearing paths, gap regeneration, building temporary sheds, etc.), coolies have been taken up from Karulai, and have camped in the forests for about ten days at a time, before returning to their homes. No difficulty was experienced in getting sufficient coolies for the above works done by the Nilambur district. But when the Logging Engineer's staff was engaged in survey and enumeration, they employed a very large number of coolies, and had to get them from distant parts of the Ernad taluk, for which purpose a ranger was on special duty, all the time, recruiting coolies.

Axemen and sawyers come from various parts of the Ernad and Walluvanad taluks, and also from parts of the Cochin State. Carpenters have been obtained from Nilambur and Manjeri.

48. *Wages.*—Felling and sawing, dragging, building construction, and road work have been done on contract; ordinary works on daily wages. In both cases the rates paid have been from 25 per cent to 50 per cent in excess of rates paid in the plains. At the present time the wage paid to men coolies for ordinary work in the plains is 5 annas per day.

CHAPTER V.—PAST SYSTEMS OF MANAGEMENT.

SECTION 1.—GENERAL HISTORY OF THE FOREST.

49. *General history.*—The New Amarampalam block, of which this tract forms a part, was purchased by Government from the Edavanna Kovilagom on the 19th December 1887, and was notified as the "New Amarampalam Reserve," under section 16 of the Madras Forest Act V of 1882 on the 25th October 1898. While the forests were in private ownership, it is fairly certain that some exploitation was done in this tract. But it was probably confined to one or two of the best species, such as teak and rosewood, and fellings can never have been extensive owing to the remoteness of the locality. The semi-deciduous forests of the tract probably suffered considerably from fire, during the period of private ownership. Subsequent to purchase by Government no exploitation of timber was attempted until 1930–31, when sleeper operations were undertaken on a small scale, as already mentioned. The right to collect minor produce has been leased (for the whole of Amarampalam Range) for a great many years, and the right to collect canes has been leased at intervals. Bamboos have been extracted from the more accessible portions of this working-plan area, at times when scarcity of bamboos for floating was experienced in the vicinity of the floating rivers. But the locality remained practically unknown, until mechanical extraction dominated the policy of management of Madras timber forests and a search was being made for a forest tract big enough to supply the Olavakode Sawmill, since the Dhoni and Sappal forests could not continue to do so. The lofty evergreen forests of New Amarampalam are a most impressive sight, and it was not unnatural that they should have aroused the enthusiasm of

Mr. J. K. Pearce, who, lacking alike experience of the country and knowledge of the existing or prospective market demands, inaugurated a " cruise " on a most lavish scale, while he acted as Chief Forest Engineer in 1926. From then, until 1929, an army of surveyors, " topographers," " baseline men," " cruisers ", etc., with their attendant coolies, were employed in mapping and enumerating the forests. The results of the enumeration are filed with the working plan records. The army was disbanded in 1929, with the termination of Mr. Pearce's contract, and their records were transferred to the writer, with instructions to make a working plan, in addition to his ordinary duties, first as District Forest Officer, Nilambur, and later as District Forest Officer, the Nilgiris. These ordinary duties allowed so little time to spare for the additional work, that the completion of the working plan was delayed until 1935. In the meantime, however, such exploitation as a depressed timber market would allow was undertaken. One thousand, three hundred and eighty broad gauge and 504 metre gauge sleepers were extracted departmentally in 1930–31, and in 1934–35 an experiment was tried in selling selected trees, standing, to a contractor. Some road and building construction was also done, as well as some experimental regeneration. There works will be referred to later.

SECTION 2.—PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS.

50. *Management prior to* 1887.—Previous to purchase by Government in 1887, it is probable that some unregulated fellings of the best species took place, but such fellings were probably not extensive. There is little doubt that, under private ownership, the forests were frequently ravaged by fire, a condition which, to this day, continues in the private forests of Malabar. The result of frequent fires appears to have been to change the character of a considerable portion of the tract from evergreen to deciduous.

51. *Fire protection under Government control.*—No special measures of fire protection have at any time been adopted in the tract covered by this working plan. But general protection, after purchase by Government, has resulted in comparative freedom from fires, and at the present time, with the exception of grass fires near the Nilgiri boundary, fires are practically unknown. The result of this freedom from fire is a gradual downward extension, towards the plains, of the evergreen type of forest. This is not a new development, but rather a reversion to what must have been the original type.

52. *Timber fellings under Government control.*—Subsequent to purchase by Government in 1887, no timber was felled (except for the few trees required to construct the Log Cabin in 1927) until 1930–31 when sleeper operations, on a small scale, were conducted in the semi-deciduous forests near Mancheri, and in the evergreen forests on Gomanmalai. *Xylia xylocarpa* down to 4½ feet girth, and *Mesua ferrea, Hopea parviflora* and *Tectona grandis* down to 6 feet girth, with certain safeguards as regards spacing to prevent over-felling, were selected and felled in these operations. The trees were sawn into sleepers at stump site, and dragged by hand to the Mancheri cart-track, whence they were carted to Nilambur. The cost of extraction was so high, and sickness amongst the sawyers and dragging coolies so severe, that the work was indefinitely postponed after the first year's experience. The felling of *Xylia* has allowed a considerable amount of natural regeneration of this species to get up, but the low girth limit has caused rather excessive opening of the canopy in places.

53. *Timber felling by purchasers.*—In 1934–35 a contract was made with a purchaser for the sale of selected trees on the following terms :—

> The period of the contract is from 12th July 1934 to 31st December 1935. The contractor is allowed to select trees of *Calophyllum tomentosum and Palaquium ellipticum* of and above 3 feet girth in the middle, and other species of 6 feet girth and over at breast-height. The interspace between any two trees marked for felling must not be less than the height of the trees. Provided the District Forest Officer passes the trees selected by the contractor, the latter is allowed to fell and convert them into logs, and drag or cart them to reverside depots. Measurement is done at the riverside depots, and the contractor then pays for the logs and poles at the rates stated in paragraph 43. Extraction of *Calophyllum* and *Palaquium* is limited to 300 trees. There is no limit placed on other species. The area covered by this contract covers portions of compartment 6, and another area to the north of compartment 7 which is not proposed for working under this working-plan. The fellings are scattered over a wide area, and are not likely to affect future working one way or another.

54. *Leases of minor produce.*—The right to collect the minor produce for the whole of Amarampalam Range (of which this tract forms part) has been leased fairly regularly for many years. The only visible effect of these leases on the forest is the scarring and ultimate destruction of *Canarium strictum*, from which dammer is obtained by firing.

Canes have also been leased at intervals. They are collected by uprooting, so that, for about two years after working, one sees few mature canes in places which are sufficiently accessible for collection.

55. *Artificial regeneration.*—In some of the gaps caused by felling *Hopea* and *Mesua* for sleepers on Gomanmalai, an attempt was made to introduce *Hopea parviflora, Acrocarpus fraxinifolius* and *Artocarpus hirsuta*, in the monsoon of 1931, by sowing and planting. But the work was done in too much of a hurry, without a prearranged plan, and the success obtained was negligible.

SECTION 3.—SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN.

56. *Roads.*—In 1930–31 an abandoned cart-track from Kanhirakadavu to the foot of the hills was re-opened, and was extended to the stream known as " Valiathodu " on the western slope of Arson Hill. Though an earth road, it is suitable for heavy timber traffic, except during the monsoon, and it has been graded for such traffic, outwards. The cost of re-opening the old road was Rs. 428–12–6, and the cost of construction of the extension was Rs. 5,293–9–11. There are, at present, no other roads in the tract.

57. *Foot-paths.*—A number of inexpensive foot-paths were made in the course of enumeration of the forests and during the preparation of this working plan, and are kept open by annual clearing. They are as follows :—

(*a*) Path from Valiathodu to the inspection shed on Arson Hill.
(*b*) Path from Valiathodu to Meenmutty.
(*c*) Path from Arson Hill inspection shed to Meenmutty—Joins (*b*).
(*d*) Path from Meenmutty to Point 1503 on the Thalipuzha.
(*e*) Path from point 1503 on the Thalipuzha to Pulimunda.
(*f*) Path from Meenmutty to Pulimunda *via* the north bank of the Karumpuzha.

With the exception of (*a*), none of the paths was deliberately graded. They mostly follow game tracks, or routes used by Shola Naickens.

58. *Buildings.*—The first building (apart from temporary camp sheds) to be erected in the tract was the " Log Cabin, " a two-roomed hut built of round logs, with mud in the interstices between them. This was built by the Logging Engineer's staff in 1927, at a cost (including a lean—to kitchen shed) of Rs. 1,823. The Log Cabin was destroyed by fire in the middle of the monsoon of 1930. The kitchen shed was left standing. There was unmistakeable evidence that incendiaries were responsible, but their identity was never established. As the site had no local name, it was named " Arson Hill " to commemorate this event. A two-roomed inspection shed, with a porch, was built on the site of the Log Cabin, in 1930–31, at a cost of Rs. 281. It requires to be completed by replacing the split bamboo walls by planking, for which the frame work of the building was designed and constructed. A big serambi was built at Meenmutty in 1931–32. It costs Rs. 2,253–15–6. The inspection shed on Arson Hill, and serambi at Meenmutty, are the only permanent buildings in the tract at present.

SECTION 4.—PAST YIELD.

59. *Timber extracted departmentally.*—The following sleepers were extracted in 1930–31 :—

Species.	Broad gauge.	Metre gauge.	Volume in cubic feet.
1 Tectona grandis	6	5	26·250
2 Xylia xylocarpa	999	387·	3,702·375
3 Hopea parviflora	76	19	266·000
4 Mesuaferrea	299	93·	1,073·875
Totals	1,380	504·	5068·500

60. *Timber removed by purchasers.*—The following timber was sold standing and removed to date by the purchaser in 1934–35 :—

Species.	Number of trees.	Volume in cubic feet.
1 Calophyllum tomentosum	36	3,430·
2 Dichopsis elliptica	2	291·
3 Dysoxylum malabaricum	4	442.
4 Artocarpus hirsuta	3	325·
5 Lagerstrœmia microcarpa	50	3,623.
6 Terminalia tomentosa	29	1,741·
7 Terminalia paniculata	1	47·
Totals	125·	9,899·

61. *Canes.*—Details of the leases for working canes prior to 1921 are not available, since the District Forest office (with its records) was burnt in the Malabar Rebellion of that year.

Subsequent to 1921, canes were leased as follows :—

Years.	Quantity of canes removed.	Amount paid by lessee.
		RS.
1922–23	133,482 canes.	1,200
1928–29	638,664 „	1,575
1933–34	240,015 „	550
Totals ..	1,012,161 canes	3,325

SECTION 5.—PAST REVENUE AND EXPENDITURE.

62. *Revenue.*—The revenue realized from the tract is given in the following table. The latter is incomplete owing to lack of details for canes prior to the rebellion of 1921, and also because it is impossible to allocate the distribution of other minor products as between the tract now dealt with, and the Conversion Working Circle of the Nilambur Valley.

Year.	Revenue from sleepers extracted departmentally.	Revenue from timber removed by purchasers.	Revenue from canes.	Total.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1922–23	..	..	1,200 0 0	1,200 0 0
1928–29	..	..	1,575 0 0	1,575 0 0
1930–31	12,649 4 0	..	..	12,649 4 0
1933–34	..	..	550 0 0	550 0 0
1934–35	..	2,000 0 0	..	2,000 0 0
Totals ..	12,649 4 0	2,000 0 0	3,325 0 0	17,974 4 0

The total revenue for the tract, as far as can be ascertained, is therefore Rs. 17,974.

63. *Expenditure.*—Excluding the cost of the working plan, which is given in Part II, the expenditure in the tract has been as follows :—

Year.	Departmental extraction of sleepers.	Construction and repairs of buildings.	Roads and paths.	Regeneration experiments.	Total.
	RS. A P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1927	..	1,823 0 0	..	..	1,823 0 0
1929–30	..	112 4 0	703 0 6	..	815 4 6
1930–31	7,078 0 0	838 12 0	3,311 2 0	68 7 0	11,296 5 0
1931–32	..	1,738 6 0	2,109 13 6	14 4 0	3,862 7 6
1932–33	..	32 12 0	509 8 11	..	542 4 11
1933–34	..	13 5 0	325 9 6	..	338 14 6
1934–35	..	..	248 15 0	..	248 15 0
Totals ..	7,078 0 0	4,558 7 0	7,208 1 5	82 11 0	18,927 3 5

The total expenditure thus amounts to Rs. 18,927.

CHAPTER VI.—STATISTICS OF GROWTH AND YIELD.

64. *Absence of statistics.*—The enumerations made by the Logging Engineer contain the only figures available for the tract dealt with. Abstracts are given in Part II, but are not considered reliable. No conclusions as to rate of growth can be reached from the enumeration data.

CHAPTER VII.—ESTIMATE OF THE CAPITAL VALUE OF THE FOREST.

65. *Capital cost in* 1887–88.—The whole of the New Amarampalam Block was purchased in auction on 19th December 1887, for Rs. 42,000. The total area of the block (which is now the New Amarampalam Reserved Forest) is 61,744 acres, so the cost per acre in 1887–88 was Rs. 0·68. The area covered by this working plan is 48,159 acres, so the capital cost of the tract at the date of purchase was Rs. 32,748.

66. *Capital value in* 1935–36.—It may be of some interest to estimate the capital value of the forest, as at the commencement of this working plan. This is done by adding compound interest, to date, from the year of purchase in respect of the land, and from the years in which expenditure was incurred, in respect of capital works. The rate of interest used in the calculation is 3½ per cent per annum.

	RS.
Cost of land Rs. 32,748 plus compound interest at 3½ per cent for 48 years	1,70,715
Road construction in 1931 Rs. 5,722, plus compound interest at 3½ per cent for 4 years	6,566
Building construction in 1927–28 (Log Cabin) Rs. 1,823, plus compound interest at 3½ per cent for 8 years	2,401
Building construction in 1930–31 (Arson Hill) Rs. 281, plus compound interest at 3½ per cent for 5 years	334
Building construction in 1931–32 (Meenmutty) Rs. 2,254, plus compound interest at 3½ per cent for 4 years ...	2,586
Total ...	1,82,602

The capital value of the forest (including roads and buildings) in 1935–36 is therefore estimated at Rs. 1,82,602 or Rs. 3·79 per acre.

PART II.

Future management discussed and prescribed.

CHAPTER I.—BASIS OF PROPOSALS.

67. *Objects of management.*—The real value of the forests in this tract lies in their ability to catch and regulate the flow of water to the plains of Malabar and to prevent erosion and landslides. The importance of hill forests in supplying water to the plains is well known. Regulation of the flow of water is essential, in order to minimize damage by floods in the Nilambur Valley and down the Chaliar. The prevention of erosion and landslides is necessary so as to avoid silting in the rivers of the valley, which are used for floating the teak and other valuable timber of the valley forests. The primary object of management is, therefore, protection. Subsidiary to this all-important object, it is desirable to improve the forest by the removal of such of the mature and over-mature trees as can be extracted profitably, and by assisting natural regeneration and introducing valuable species artificially.

68. *Methods of treatment.*—In order to preserve the essentially protective character of the forest it is necessary to avoid excessive openings. The method of treatment will be careful selection fellings of such species as can be profitably extracted, together with silvicultural operations which are designed to replace the trees which are removed, by trees of equal or greater value, and to introduce valuable species in certain other places where no felling is prescribed.

69. *Working Circles and their constitution.*—Three working circles are constituted, viz., the Selection Working Circle, the Minor Produce Working Circle, and the Bamboo Working Circle.

70. *Period of working plan and necessity for intermediate revision.*—The period of the working plan will be from 1937–38 to 1947–48, i.e., 11 years. It is not considered possible to work over the whole tract in this time. The period is chosen simply for convenience, so as to coincide with the third revision of the Nilambur Valley Working Plan, when the whole of the Nilambur division can be brought under a single plan. No necessity for intermediate revision can be foreseen at present, though deviations from the regeneration proposals may be required as experience is gained.

CHAPTER II.—WORKING PLAN FOR THE SELECTION WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF THE VEGETATION.

71. *General constitution.*—The Selection Working Circle consists of 18,425 acres of the less inaccessible portions of what is described in the Nilambur Valley Working Plan as the "Inaccessible Working Circle". It comprises most of the area mapped and

enumerated by the Logging Engineering branch under Mr. J. K. Pearce, late Logging Engineer to the Government of Madras, omitting only some small areas bordering on the Conversion Working Circle of the Nilambur Valley which, being largely fit for teak planting, are being added to that Working Circle, and one of the highest of the enumerated blocks, which even in the wildest flights of fancy, nobody could dream of endeavouring to work by any means which are, or are likely to become, available, in these forests.

72. *Character of the vegetation.*—The vegetation varies from semi-deciduous to evergreen, the former being found at the lower elevations, and the latter from about 1,500 feet, upwards. *Bombusa arundinacea* is often found in the semi-deciduous forest, either scattered amongst the trees, or in pure patches. Gregarious patches of reed (*Ochlandra sp.*) are frequently found in the evergreen forest. There are occasional grass-clad areas, where soil is deficient, and a considerable amount of precipice and slab rock. The commonest species in the semi-deciduous forest are—*Terminalia paniculata, Xylia xylocarpa, Lagerstrœmia microcarpa, Terminalia tomentosa, Stereospermum chelonoides, Terminalia belerica, Bombax malabaricum,* and *Tetrameles nudiflora.*

In the evergreen forest the commonest species are *Palaquium ellipticum, Cullenia excelsa, Calophyllum tomentosum, Terminalia belerica, Eugenia gardneri, Bischofia Javanica,* a species of *Hopea* (possibly *Odorata*), *Machilus macrantha, Elæocarpus spp., Lagerstrœmia microcarpa, Mesua ferrea, Dysoxylum malabaricum, Cedrela toona,* and *Acrocarpus fraxinifolius.* In the semi-deciduous forest, pole and seedling growth is deficient, in proportion to the middle-aged and mature trees, with the exception of *Xylia xylocarpa,* of which all age classes are suitably represented. The evergreen, generally speaking, is a typical selection forest of all ages.

SECTION 2.—DIVISION OF THE AREA.

73. *Division of the area.*—The area is divided into 13 compartments. The compartments are numbered in the order in which working should proceed. At the time of writing, the demand for timber from this working circle is almost non-existent, and the future of the tract is so obscure that it is impossible to allot coupes for annual working. In the unlikely event of it becoming possible to work a whole compartment each year, this will be done, in which case the compartments would become annual coupes. Otherwise, as much as possible will be worked each year, following the order of the compartments.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

74. *Mapping and enumeration under the direction of Mr. J. Kenneth Pearce.*—An area of 19,772 acres was mapped and enumerated, by various methods, under Mr. J. Kenneth Pearce (late Logging Engineer) between 1926 and 1929. The methods employed, results obtained, and conclusions reached by him, are contained in his report of 1929. Since this working plan does not contemplate the wholesale logging of these forests which appears to have been Mr. Pearce's idea, it is unnecessary to reproduce his full report and figures in Part II. But in view of the vast expenditure incurred, it is considered desirable that his report should be permanently on record, so it is recorded with an R. Disposal number in the office of the Conservator of Forests Working Plans Circle. Where diameters were callipered, Mr. Pearce worked down to 12 inches diameter at breast-height in the case of sleeper woods, and to 18 inches in the case of other species. He concluded that this area of 19,772 acres contained 119 lakhs of cubic feet of timber of and above these diameter limits, 8½ lakhs of cubic feet being sleeper woods.

75. *Value of the enumeration data.*—Mr. Pearce has expressed his general satisfaction as to the accuracy of the enumeration figures; where he was not satisfied about their reliability he either said so, or modified the figures by an arbitrary reducing factor. The writer of this working-plan, rightly or wrongly, does not share Mr. Pearce's confidence, for the following reasons :—

(*a*) On 5,044 acres (or one-quarter of the area) no measurements whatever were made. The data recorded are only the eye-estimates of height and of middle diameter. The blocks referred to are A line, B line, E line and Shola).

(*b*) Of 3,733 acres (Block P.T.M./S.S.C.) approximately 149 acres were enumerated in sample strips. This amounts to only 4 per cent of the area of the block, and in such very mixed forest, the result of enumerating this small proportion can only be definitely misleading, in the writers opinion.

(*c*) Of 1,267 acres (Block T.S.) 472 acres were enumerated, but Mr. Pearce considered that the strips chosen were so much better than the average of the area, that he arbitrarily divided the results by two.

(*d*) In the remaining area, of about 9,700 acres, the percentage of enumeration was sufficient, varying, as it did, from 25 per cent to 100 per cent. But even here, the writer does not consider the results reliable. Accurate identification of a host of shola species by Foresters (mostly recruited direct, and with no previous experience) could not be expected. Further, with the best will in the world, their work, in this dense forest and extremely difficult country, could not be adequately supervised. Finally, the " cruise-sheets " with their mass of omissions, corrections, overwritings, etc., convey no feeling of confidence, either in the measurements recorded, or in the calculation of volumes.

76. *Method of analysis of enumeration of figures by the Working Plan Officer.*—Since the method of enumeration used was decided with a view to wholesale exploitation, it was difficult to see how the figures could be used in preparing a working-plan whose main object is to preserve the forest for climatic reasons. The girth limit of enumeration was not low enough to permit of the determination of the distribution of age-classes. Finally, the Working Plan Officer decided that for the purposes of this working-plan the only information which could be of any assistance would be data regarding the more valuable species of trees, of the exploitable size, in each compartment or sub-compartment. He therefore analysed the " cruise-sheets " and abstracted numbers and volumes of trees of what he considered to be the best species, down to a breast-height girth (or corresponding diameter) limit of five feet for *Xylia xylocarpa* and six feet for all other species. Where only the estimated middle diameters were given, he prepared graphs to show the corresponding breast-height diameters from the data given in the blocks where breast-height diameters were measured in addition to the estimation of middle diameter. For volumes of trees he adopted (with little conviction) the volumes given in the " cruise-sheets," and in the case of partial enumerations he made his calculations of totals from the percentages noted in the " cruise-sheets." The work was done as carefully as possible, but since many of the " cruise-sheets " are very confusing (in places, even unintelligible) he presents his analysis with diffidence, and does not consider that his figures may be taken as anything more than a rough indication of where quantities of big trees of the better species can be found. No attempt was made to analyse the figures of the P.T.M./S.S.C. or of the T.S. blocks. The latter is too steep, rugged and remote to permit of any timber working, and the figures for the former are considered by the writer to be misleading for reasons given in the preceding paragraph. The compartments made by the writer mostly correspond to Mr. Pearce's enumeration blocks; in a few cases, two enumeration blocks have been joined to make a single compartment. Where sub-compartments have been distinguished, they were made partly to facilitate the work of analysis, and partly to localize, more accurately, the distribution of the better species. The species considered by the writer to be the most valuable are as follow :—

Acceptable as sleepers.

1. *Tectona grandis.*
2. *Xylia xylocarpa.*
3. *Hopea parviflora.*
4. *Mesua ferrea.*

Other valuable or potentially valuable species.

1. *Acrocarpus fraxinifolius.*
2. *Dysoxylum malabaricum.*
3. *Dalbergia latifolia.*
4. *Artocarpus hirsuta.*
5. *Artocarpus integrifolia.*
6. *Calophyllum tomentosum* (syn. *elatum*).
7. *Cedrela toona.*
8. *Terminalia paniculata.*
9. *Terminalia tomentosa.*
10. *Lagerstrœmia lancelata* (syn. microcarpa).
11. *Palaquium ellipticum.*

77. *Analysis of valuable species.*—The results of the analysis of the more valuable species, determined as described in the preceding paragraph, are given by compartments, in the following table. The compartment numbers corresponding to Mr. Pearce's enumeration blocks are as follow :—

Compartment number.	Area in acres.	Enumeration block.	Compartment number.	Area in acres.	Enumetation block.
1	1,511	AC.	8	1,002	NP *plus* NA.
2	814	CB West.	9	848	B.A. *plus* BV.
3	1,243	CB East.	10	1,320	AP.
4	1,227	BN	11	1,015	ARS.
5	1,394	A Line.	12	682	CAX.
6	2 093	B Line plus Shola.	13	3,733	PTM/SSC.
7	1,543	E Line.	Not considered.	1,267	TS.

Results of enumeration of Valuable Species by Logging Engineer.

Numbers and volumes by compartments of Xylia xylocarpa of and above 5 feet breast height girth and of all other species of and above 6 feet breast height girth.

Species.	Compartment 1 Number of trees.	Compartment 1 Volume in cubic feet.	Compartment 2 Number of trees.	Compartment 2 Volume in cubic feet.	Compartment 3 Number of trees.	Compartment 3 Volume in cubic feet	Compartment 4 Number of trees.	Compartment 4 Volume in cubic feet.
Acceptable for untreated sleepers—								
1 Tectona grandis ..	37	1,429	18	984	..	..	..	..
2 Xylia xylocarpa ..	1,656	47,264	344	11,405	..	..	304	16,046
3 Hopea parvifloria ..	51	3,129	..	..	..	..	22	2,030
4 Mesua ferrea	..	..	..	..	5	200	1	55
Total, sleeper woods..	1,744	51,822	362	12,389	5	200	327	18 131
5 Acrocarpus fraxinifolius ..	1	37	33	4,396	25	1,984	169	18,781
6 Dysoxylum malabaricum.	2	73	..	..	21	2,107	44	2,846
7 Dalbergia latifolia ..	52	2,126	16	460	3	187	50	4,434
8 Artocarpus hirsuta ..	25	2,068	38	2,105	31	3,106	38	2,786
9 Artocarpus integrifolia ..	..	..	6	276	3	166	12	807
10 Calophyllum tomentosum (or elatum).	30	2,418	37	3,751	155	20,471	835	96,912
11 Cedrela toona	9	596	19	1,186	2	202	48	4,762
12 Terminalia paniculata ..	2,146	120,837	977	58,686	153	7,980	1,176	92,398
13 Terminalia tomentosa ..	74	4,825	39	1,800	..	..	..	..
14 Lagerstromeia lanceolata or mirocarpa.	735	47,314	517	34,303	203	12,139	685	53,359
15 Dochopsis elliptica ..	7	1,000	1	51	158	7,758	772	63,941
Totals ..	4,825	233,125	2,045	119,403	759	56,300	4,156	359,157

Species.	Compartment 5 Number of trees.	Compartment 5 Volume in cubic feet.	Compartment 6 Number of trees.	Compartment 6 Volume in cubic feet.	Compartment 7 Number of trees.	Compartment 7 Volume in Cubic feet.	Compartment 8 Number of trees.	Compartment 8 Volume in cubic feet.
Acceptable for untreated sleepers—								
1 Tectona grandis ..	16	724	36	1,880	10	420	..	..
2 Xylia xylocarpa ..	2,637	96,625	1,477	53,049	367	13,358	..	..
3 Hopea parviflora ..	..	..	14	1,054	..	..	70	6,362
4 Mesua ferrea	..	..	..	..	..	..	262	17,585
Total, sleeper woods ..	2,653	97,34	1,527	55,983	377	13,778	332	23,947
5 Acrocarpus fraxinifolius ..	10	544	8	668	3	123	20	2,094
6 Dysoxylum malabaricum.	..	..	64	3,922	..	..	273	20,298
7 Dalbergia latifolia ..	82	4,778	85	4,582	..	..	..	..
8 Artocarpus hirsuta ..	6	380	142	8,238	21	1,067	52	4,023
9 Artocarpus integrifolia ..	..	..	4	472	4	164	6	326
10 Calophyllum tomentosum (or elatum).	62	4,570	1,512	100 168	..	..	531	57,189
11 Cedrela toona	4	204	34	1,965	11	501	39	2,866
12 Terminalia paniculata ..	2,216	116,832	2,253	127,567	626	32,721	18	1,433
13 Terminalia tomentosa ..	363	19,647	166	9,410	35	2,029	..	..
14 Lagerstromeia lanceolata or mirocarpa.	585	31,595	1,187	70,548	420	23,219	174	14,065
15 Dochopsis elliptica ..	16	1,040	312	17,615	..	..	1,495	98,631
Totals ..	5,997	276,939	7,294	401,138	1,497	73,602	2,940	224,872

Species.	Compartment 9 Number of trees.	Compartment 9 Volume in cubic feet.	Compartment 10 Number of trees.	Compartment 10 Volume in cubic feet.	Compartment 11 Number of trees.	Compartment 11 Volume in cubic feet.	Compartment 12 Number of trees.	Compartment 12 Volume in cubic feet.	Total. Number of trees.	Total. Volume in cubic feet.
Acceptable for untreated sleepers—										
1 Tectona grandis ..	..	..	..	..	..	..	..	..	117	5,437
2 Xylia xylocarpa ..	..	..	..	..	166	7,878	..	..	6,951	245,625
3 Hopea parviflora ..	64	6,845	18	1,741	48	4,672	..	..	287	25,833
4 Mesua ferrea	71	4,153	1,060	72,903	272	20,494	1,265	94,300	2,936	209,690
Total, sleeper woods ..	135	10,998	1,078	74,644	486	33,044	1,265	94,300	10,291	486,585
5 Acrocarpus fraxinifolius..	188	13,358	430	51,727	248	23,823	35	3,850	1,170	121,385
6 Dysoxylum malabaricum.	280	20,639	152	11,782	42	2,307	45	2,870	923	66,844
7 Dalbergia latifolia ..	5	335	3	207	23	1,702	..	..	319	18,811
8 Artocarpus hirsuta ..	53	4,668	8	654	37	2,958	2	127	453	32,180
9 Artocarpus integrifolia ..	12	558	28	1,527	17	1,028	23	1,142	115	6,466
10 Calophyllum tomentosum (or elatum).	884	109,573	319	39,706	478	56,681	61	6,225	4,904	497,664
11 Cedrela toona	61	5,636	101	9,019	29	2,572	62	7,808	419	37,317
12 Terminalia paniculata ..	18	1,628	..	..	183	11,886	..	..	9,766	571,968
13 Terminalia tomentosa	..	..	..	..	..	..	..	..	677	37,711
14 Lagerstromeia lanceolata or mircecarpa.	237	18,067	796	17,320	354	28,867	..	..	5,293	350,796
15 Dochopsis elliptica ..	3,436	230,545	2,903	248,556	1,828	133,231	1,564	100,933	12,492	903,310
Totals ..	5,309	416,005	5,218	455,142	3,725	298,099	3,057	277,255	46,822	3,131,[illegible]37

SECTION 4.—METHOD OF TREATMENT.

78. *Silvicultural system.*—The main object of management being the protection of the forests of an enormous water catchment area, and the forest being composed of a large number of species of which only a few are valuable, this working circle will be worked under the selection system.

79. *Choice of species.*—Under the selection system, the regeneration of the forest has to be mainly natural. But the artificial introduction of valuable species will be undertaken in the gaps resulting from selection fellings in the semi-deciduous forest. And further to improve the forest, artificial regeneration under shade, will be undertaken in the neighbourhood of roads, also in semi-deciduous forest. The species now prescribed for artificial introduction will possibly require modification after the experience of the first few years working, and if early success is not obtained, the Provincial Silviculturist should be asked for suggestions, either for changing the species or improving the methods used. For the present, the following species are chosen for artificial work: *Teak, Artocarpus hirsuta, Hopea parviflora, Cedrela toona, Swietenia macrophylla and Chickrassia tabularis.*

80. *Exploitable size.*—If all or most of the species in the tract had a market value, it would be necessary to fix the exploitable size (or different sizes for different species) in such a way as to avoid over-felling. But since the present demand is so very limited, and the prospects of early improvement in demand somewhat remote, it is considered preferable to prevent over felling by restricting the number of trees which may be felled on a given area, and to fix the exploitable size in accordance with market requirements. For example there is, at present, some demand for Poon poles for masts, and it is unlikely that there will ever be a demand for Poon of large size, at any rate in the remoter localities. This being so, there is no reason why the minimum exploitable size for Poon should not be fixed at 4 feet girth at breast-height, knowing that only the trees between 4 feet and 5 feet girth will be felled, and that the bigger trees will be left as seed bearers. *Xylia xylocarpa* of 5 feet girth is large enough for sawing broad-gauge sleepers, and it frequently becomes unsound before it reaches 6 feet girth. For any other species which can be profitably extracted, a minimum exploitable size of 6 feet girth at breast-height appears suitable. The exploitable size is therefore fixed as follows:—

Poon (*Calophyllum spp.*) a minimum of 4 feet girth at breast-height.

Xylia xylocarpa, a minimum of 5 feet girth at breast-height.

Other species which can be sold, a minimum of 6 feet girth at breast-height.

81. *Felling cycle.*—For the good of the forest it would be desirable to remove the mature and over-mature trees in a period of ten years. But unless there is a phenomenal improvement in the demand for timber, and in its prices, it is unlikely that the whole forest can be worked in 20 years, and it is more than likely that parts of this working circle will never be exploited. The circle has been divided into 13 compartments, numbered in their order of working, and all that can be prescribed at present is that the first felling cycle will not be less than 13 years.

82. *Coupes.*—Should it prove possible to work a whole compartment each year, the 13 compartments will be the annual coupes. But there is little hope of such an eventuality, so it is prescribed that working will proceed in the order of the compartment numbers, the coupe of each year being as much as can be worked profitably, but not exceeding a compartment in any year, except to make up arrears.

SECTION 5.—EXPLOITATION.

83. *Agency of exploitation and sale of timber.*—There is no objection to departmental extraction provided the management can make sure, beforehand, of a reasonable profit on the operations. But as the earlier attempt at departmental extraction of sleepers have not been encouraging, it is suggested that trees be sold, standing, to contractors. Whatever the agency of exploitation, the District Forest Officer will have to ascertain, in advance, what species can be profitably worked, and enumeration will be confined to such species.

84. *Coupe maps.*—Before commencing the enumeration of a compartment, a working map should be traced from the topographical blue prints of the engineering branch, and on it should be marked as accurately as possible, the position of each tree marked for extraction. Then, should it be possible to sell only a portion of the timber in the year of working, the strip containing the trees that can be sold in the year can be readily marked by comparing the map with the enumeration register. After felling, the trees actually felled will be marked on the map, as well as the extraction paths, etc., that are made, and the gaps chosen for regeneration. Four copies of the map will be required, one for the control journal, one for the regeneration ledger, and two for use in the field.

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85. *Marking for felling.*—The marking and enumeration for each year should be commenced after the monsoon of the previous year, and completed by the end of December. The following rules of marking will be observed :—

(*a*) Mark only the species for which a market demand has been ascertained.

(*b*) Mark only trees of the following minimum girths at $4\frac{1}{2}$ feet above ground-level :—
Poon, 4 feet.
Xylia xylocarpa, 5 feet.
Other saleable species, 6 feet.

(*c*) No tree may be marked for felling if it is within 60 feet of another tree which has also been marked, the only exception being that in semi-deciduous forest, when two trees are so close together that they can be felled so as to form a single gap, both may be marked.

(*d*) Unsound trees will not be marked for felling.

(*e*) Marking must proceed systematically from one end of the compartment to the other, commencing from the end nearest to the plains.

(*f*) Serial numbers will be marked on the trees in tar. Numbering will be done both at breast-height and near ground-level, so that each stump can be identified after felling.

(*g*) The position of each tree marked will be noted, by its number, in the coupe map.

(*h*) All climbers on trees marked, and on neighbouring trees, will be cut at the time of marking, to prevent damage to standing trees during felling, and to improve their growth.

(*i*) The usual enumeration register will be prepared, containing enumeration numbers, species, girth at breast-height, estimated merchantable height and estimated volume. If departmental extraction of sleepers is contemplated, an estimate should be made of the number of broad-gauge and metre-gauge sleepers which can be expected from each tree.

86. *Felling.*—Felling should be done with the least possible damage to the tree felled and to neighbouring trees of valuable species. Subject to the above considerations, where it is possible in semi-deciduous forest, to fell two trees so as to form a single gap, this should be done.

87. *Conversion.*—Timber will be converted in such ways as the demands of the market, and the extraction facilities indicate. Owing to the difficulty of extraction from most parts of the working circle, it is probable that the bulk of the timber will have to be hand-sawn in the forest. If the exploitation is by departmental agency, wasteful conversion must be guarded against. In the case of exploitation by purchasers, all that is required is to see that they do not damage the trees during felling; for unless it is found impossible, purchasers should be made to cut off the crown, without wastage at the top of the bole, and to pay for sound trees by the volume in the round, as measured departmentally at stump-site. Sawyers must not cut valuable species for making scaffolds. Trees felled for making scaffolds should, as far as possible, be selected round the perimeter of a gap so that their removal may enlarge the gap.

88. *Accounting and check.*—In the event of departmental working, the usual rules for maintenance of timber returns, and for check of depots, will be observed. If exploitation is by purchasers, the District Forest Officer will adopt such means of check as he finds necessary, to ensure that all sound timber felled is paid for, and to prevent fraud.

89. *Extraction.*—Proposals for road construction will be made in a later chapter. Extraction to these roads will have to be by dragging. In the less difficult places elephants and buffaloes can be used, but in the steeper country the timber will have to be man-handled. Whatever the agency of extraction, the main extraction paths for dragging, should be aligned and made departmentally. They should be of a gradient suitable for animal haulage, and, where possible, should traverse the coupe centrally. But this will often be impracticable, and the paths will have to take their course according to the lie of the land. Suitable courses for main drag-paths are usually to be found along the main streams. Not more than two main drag-paths should be required for each coupe, and, ordinarily, one should suffice. They will be made as and when required, and the District Forest Officer should decide what is necessary before each coupe is taken up for working. An exact specification of the work to be done is unnecessary. It is sufficient to state that the path should be such as to make dragging as easy as possible, and should be located so as to involve the minimum of cutting and levelling. Subsidiary drag-paths will also be required, in each coupe. If, as is most likely, extraction is done by purchasers, they will make their own arrangements for subsidiary drag-paths. If the work is departmental, provision should be made in the felling estimate for making such subsidiary paths as

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may be necessary. Little expenditure will be required. Where sawn timber has to be taken across the main streams, pulley blocks riding on wire ropes should be used. (The department has a stock of these stores remaining over from the era of mechanical extraction.) Such contrivances are easily erected, and easily moved from place to place.

SECTION 6.—REGENERATION AND TENDING.

90. *General scheme of artificial regeneration.*—Artificial regeneration in these forests is complicated by the imperative necessity to avoid clearings. (See paragraphs 67 and 68.) The artificial regeneration of the gaps caused by selection fellings, in various evergreen forests in the Presidency, has now had a determined trial extending over a number of years, but in no case has success been obtained. Even in deciduous forests, the advisibility of artificially regenerating such gaps seems to be open to question; some senior officers are strongly in favour of gap regeneration; others think it is not worth the money spent. In these circumstances, it is not proposed to do any artificial regeneration (except experiments) in the evergreen forests of this tract, and to restrict artificial regeneration of gaps in semi-deciduous forest to those of larger size, i.e., 400 square yards, and upwards in area. Natural regeneration will, however, be assisted in all felling gaps. These proposals will insure that the forest will be left in at least as good condition as prior to selection felling, and this might be regarded as all that is necessary. But it is proposed, in addition, to undertake concentrated artificial regeneration (mainly under shade) in the semi-deciduous forests, at the rate of 5 acres each year during the first working-plan period, and with a view to ultimate facility of extraction, this work will be undertaken only in the vicinity of roads. This regeneration of 5 acres per year should be regarded as the most important part of the programme of artificial regeneration.

91. *Gaps requiring no artificial regeneration.*—No artificial regeneration need be attempted, (*a*) in any gaps in evergreen forest, (*b*) in gaps of less than 400 square yards in area in semi-deciduous forest, (*c*) in gaps of any size in semi-deciduous forest which contain 25 or more saplings or established seedlings of any of the following species :—

Teak, Rosewood, Xylia xylocarpa, Artocarpus fraxinifolius, Acrocarpus hirsuta, Hopea parviflora, or *Cedrela toona.* Seedlings of the above species must, however, be marked with strong stakes about 3 feet long.

92. *Artificial regeneration of gaps in semi-deciduous forest.*—In semi-deciduous forest in the gaps resulting from felling which are over 400 square yards in area, and which do not contain the requisite amount of nautral regeneration of valuable species as described in the last paragraph, the following artificial work will be undertaken in the year following the felling :—

In the centre of the gap, where light is considered sufficient for raising teak, the felling slash will be strewn not later than the end of December of the year of felling. It is important that no material more than 18 inches in girth should be used for burning in the gaps. Bigger pieces produce too hot a burn, and apart from this take too long to burn out, with a consequent waste of time in watching. The slash will be burnt at the end of February, taking care that fire does not escape from the gap. Not less than 15 teak stumps will be planted in the burnt area. Probably between 1st and 15th April will be the best time. The espacement will vary according to the size and shape of the gap, in order to give to each teak plant, as much light as possible; but the spacing should not be less than 3 feet nor more than 6 feet apart. The teak stumps will be planted in crowbar holes. Around the periphery of the gap (i.e., outside the central, burnt area) seed of *Hopea parviflora* will be dibbed copiously, wherever the shade is most suitable, in not less than 15 pits, and the pits should not be closer to one another than 3 feet. (The espacement will be irregular, to secure the shade conditions which are most desirable.) For sowing *Hopea* circles of 2 feet diameter should be cleared of all growth and the soil worked to a depth of 9 inches; the seed should be scattered copiously over the cleared circle, covering the seed (though not necessarily the wings) with about 1 inch of earth. The date of dibbling *Hopea* depends on the ripening of the seed, since it keeps for only a few days after ripening. Latitude is however allowed to the District Forest Officer to modify the details for the introduction of *Hopea* if experience shows this to be desirable. All the patches (or pits) which are artificially regenerated either with teak or with *Hopea* will be marked with strong stakes of about 3 feet in length. In addition, all established natural seedlings of the following species, in each gap, will be similarly staked :—

Teak, Rosewood, Xylia Xylocarpa, Acrocarpus fraxinifolius, Artocarpus hirsuta, Hopea parviflora, and *Cedrela toona.*

In September, or early October, all gaps should be examined, and the necessary weeding done. A 4-foot diameter circle round each established teak plant must be weeded by digging. In the case of *Hopea*, it will suffice to pull out weeds and free the heads of the seedlings from overhead cover. Further weeding before the monsoon of the second year is left to the discretion of the District Forest Officer. In May of the second year, any gap with 20 or more successful patches whether of teak or of *Hopea*, or both, may be considered a success. If less than 20 patches are successful, all casualities amongst the *Hopea* will be replaced as described for the first year. Casualties amongst the teak will be disregarded. Whether casualities have been replaced or not, another weeding should be carried out in September or October of the second year, unless the District Forest Officer is satisfied that it is unnecessary.

At the time of each operation connected with artificial regeneration in these gaps, the natural seedlings of valuable species which have been staked will be tended as required. No weeding or tending is prescribed after the second year.

93. *Tending of natural regeneration in gaps.*—Tending of natural regeneration, in gaps which are to be artificially regenerated, has been prescribed in the preceding paragraph. In all other felling gaps, both in evergreen and in semi-deciduous forest, natural seedlings and saplings of the better species should be tended by the subordinates, at least in the year after felling, and if practicable in the second year after felling, also. Tending should consist of weeding round seedlings, and cutting climbers and overhead shade to assist saplings. Such seedlings and saplings need not be staked, nor need the tending be recorded in the control records, other than by such notes as the District Forest Officer thinks it desirable to make in the Control Journal. The following species are suggested for this tending by subordinates, but the list is not exhaustive :—

Teak, Rosewood, Xylia xylocarpa, Acrocarpus fraxinifolius, Artocarpus hirsuta, Hopea parviflora, Cedrela toona, Dysoxylum malabaricum, and *Mesua ferrea.*

94. *Concentrated artificial regeneration near roads, in semi-deciduous forest.*—To increase the value of the forest, the most important part of the artificial regeneration programme of this working plan is the concentrated regeneration of small areas of good soil in the semi-deciduous forests in the close proximity of the extraction roads and preferably above the roads, to facilitate ultimate dragging. Five acres will be regenerated each year of the working plan period. The work should be commenced in the most accessible place, i.e., near where the Mancheri road enters compartment 1, and should proceed inwards along the road, annually. When felling has reached compartment 6, the District Forest Officer may, for convenience of supervision, leave the Mancheri road, and undertake this concentrated regeneration in the vicinity of the road proposed to be made above Pulimunda. But since only a short length of this proposed road lies within the working plan area, it will not be possible to choose sites for many years' work in its vicinity. The areas to be regenerated each year should be selected by the District Forest Officer in the preceding year. They must be close to the road, and should, if possible, be roughly square, though this is not essential. Five acres will be taken up each year, commencing in 1937–38. Where possible each year's work should be in a single plot, but if necessary two or more plots may be selected. The areas selected should contain good soil; in practice, it will be found that a great deal of the country along the roads is good enough. Since clearings are prohibited under the objects of management, regeneration will have to be under the shade of the existing semi-deciduous forest, unless any blank areas of good soil should be found. Both *Hopea parviflora* and *Swietenia macrophylla* have been successfully raised in very similar conditions of shade in the plains of Nilambur, and these two species are prescribed for the regeneration work now proposed. But *Artocarpus hirsuta, Cedrela toona,* and *Chickrassia tabularis* are other good species which can be raised in such conditions, and they also should be tried in consultation with the Provincial Sylviculturist. If there are any blanks, with good soil, *teak* should be used. The final choice of species (one or several) to be raised each year is left to the District Forest Officer, who may consider it desirable to vary the species within each plot, with the varying conditions of shade found. If blank areas suitable for *teak* are found, the espacement should be 6 feet by 6 feet. Otherwise the espacement will be 9 feet by 9 feet. The regeneration areas will be aligned and staked in the ordinary manner, using stout stakes about 3 feet long, in the beginning of April. *Teak* (if blank areas are found) will be stump planted in crowbar holes, after burning such ground cover as is available, and will be weeded by digging, in 4-foot diameter circles, twice in the first year. Probably between 1st and 15th April will be the best date for stump planting. *Hopea parviflora*, where used (probably extensively), will be sown and tended as described in paragraph 92 under gap regeneration. *Swietenia macrophylla,* when used, will be planted and tended by the methods considered best for raising this species under shade in the Nilambur plains. (At the time of writing,

Swietenia macrophylla transplants of 1½ feet by 2 feet high appear to find the greatest favour in Nilambur). For raising the other species recommended, the Provincial Sylviculturist should be consulted as to the most suitable method of regeneration and tending.

In the second year, casualties amongst teak (if it has been planted) may be disgarded. But all casualties amongst the other species must be replaced, by the method used in the first year. Weeding, of all species, before the monsoon of the second year, is left to the discretion of the District Forest Officer. But whether casualties have been replaced or not, a further weeding in September or October of the second year will probably be found desirable, and should be done unless the District Forest Officer is satisfied that it is not required.

Subsequent to the second year, no further work is prescribed, but the plantations should be inspected annually by the District Forest Officer, who should decide what work, if any, in the way of tending, is necessary, and get it done.

The beneficial effect of fencing, round these areas of concentrated regeneration, may be so great as to justify the extra cost. One acre should be fenced, for comparison with the unfenced area, in 1936–37 or 1937–38. See further details, under "Experiments," in paragraph 119.

A regeneration ledger, with a surveyed sketch of each area will be maintained—see Appendix A.

95. *Climber cutting.*—Climber-cutting, while marking for selection felling, has been prescribed in paragraph 85. Climber cutting on saplings in gaps, has been prescribed in paragraph 93. No further climber cutting need be undertaken.

SECTION 7—CONTROL.

96. *Control forms.*—The following control forms will be kept for the operations prescribed for the selection working circles :—

(*a*) The control book—for fellings.

(*b*) The regeneration ledger, with maps—see paragraphs 84, 94 and 121. Gaps which are artificially regenerated should be marked in the maps.

(The record of works and the Control Journal will be maintained for the working plan area as a whole).

97. *Maps.*—The coupe maps prescribed in paragraph 84 will form part of the control records for this working circle. One copy will be attached to the Control Journal, and one to the regeneration ledger for gap regeneration. Maps of the annual 5-acre regeneration areas prescribed in paragraph 94, showing species, will also form part of the control records. One copy should be attached to the Control Journal, and one copy to the regeneration ledger for concentrated regeneration.

CHAPTER III.—WORKING PLAN FOR THE MINOR PRODUCE WORKING CIRCLE.

98. *Constitution of the Minor Produce Working Circle.*—The Minor Produce Working Circle covers the whole area under this Working Plan.

99. *General lease of minor produce.*—All the lease of minor produce of the Amarampalam Range, excluding canes, is given out annually on a single lease, to be worked by the purchaser—see paragraph 329 of the Working Plan for the Nilambur valley. These leases will continue and will be controlled in the Nilambur Valley Working Plan as before.

100. *Lease of canes.*—Canes are not found in the Conversion Working Circle of the Nilambur valley, being restricted to the higher elevations of the tract for which the present working plan caters. The working of canes will therefore cease to be regulated by the working plan for the valley, since they belong, properly, to the working plan for the hills. The method of extracting canes is to uproot them, and it takes about four years, from each working, for them to be present in sufficient quantity to allow of further working. Canes will therefore be worked on a rotation of four years. The right to work the canes will be sold in auction, as heretofore, or, failing that, by tender. But in order to ascertain the real value of the lease, it is prescribed that they be worked *once* departmentally. Canes have been leased for 1935–36, so they will first be worked, under this working plan, in the year 1939–40.

The effect, on production, of working covers by uprooting them, even as infrequently as once in four years, has never been studied in detail. It is therefore prescribed that the District Forest Officer will arrange with the Provincial Sylviculturist for an investigation of this point under an experiment designed by the latter and carried out by the division. This investigation will begin in 1937–38.

101. *Control.*—The period of each lease (or of departmental working), the outturn of canes, and the revenue and expenditure will be recorded in the Control Book. See sample entries in Appendix A.

CHAPTER IV.—WORKING PLAN FOR THE BAMBOO WORKING CIRCLE.

102. *General.*—There is little demand for bamboos from the hill forests, owing to their remoteness. Nevertheless, in times of scarcity, bamboos have, in the past, been extracted from the lower parts of these forests, for floating timber.

103. *Prescriptions.*—Bamboos will continue to be worked, as required, under the prescriptions in paragraphs 325, 326 and 327 of the Nilambur Valley Working Plan, since it is not practicable to incorporate separate prescriptions in this working plan.

CHAPTER V.—MISCELLANEOUS REGULATIONS (PRESCRIBED AND SUGGESTED).

SECTION 1.—ROADS AND OTHER EXPORT WORKS.

104. *Roads.*—A road construction scheme for the whole Nilambur district was prepared and submitted by the writer, in 1932, and a start has been made in giving effect to the scheme. A road from Kanhirakadavu to Nedungayam, on the south of the Karumpuzha, is essential to the working of the tract covered by this working plan. But as it concerns primarily, the Conversion Working Circle of the Nilambur Valley Working Plan, it need not be prescribed here. For working the hill forests, the construction of two roads is prescribed. The first will be an extension of the Mancheri road, from the stream known as "Valiathodu" to a point close to the left bank of the Panapuzha, near Edakutti. This extension was aligned in 1932, by Mr. M. S. Rangaswami, Extra Assistant Conservator of Forests, and the survey and other records are in the Nilambur District Forest Office. The length of the extension will be about three miles, and the cost about Rs. 5,100. The second road will be from the Pulimunda bungalow, up the Thalipuzha Valley, for a distance of about 1¾ miles from Pulimunda. This road has not been aligned, but is roughly marked in the working plan map. It is estimated to cost about Rs. 1,000. Both will be earth roads, with rough-stone revetments for crossing streams and nullahs. They should be constructed in sections, as they become necessary for extraction. But to allow them time to settle, it would be well to construct each section two years in advance of the year when it will first be used for carting timber.

105. *Repairs to roads.*—Roads will be repaired as required.

106. *Drag-paths.*—Main drag-paths will be constructed as and when required for extracting timber—see paragraph 89. Subsidiary drag-paths will also be required in each coupe, as described in the same paragraph.

107. *Wire ropes at stream crossings.*—For taking sawn timber across wide and rocky streams, wire ropes with pulley blocks are suggested. These are portable, and can be set up where required, from time to time. It is unlikely that more than three sets will need to be in use at any one time. The material for three sets should be reserved in the Engineering Stores, in readiness for the time when they will be required.

108. *Foot-paths.*—The following existing foot-paths will be cleared annually :—

(*a*) Path from Valiathodu to the inspection shed on Arson Hill.
(*b*) Path from Valiathodu to Meenmutty.
(*c*) Path from the inspection shed on Arson Hill to Meenmutty—joins path (*b*).
(*d*) Path from Meenmutty to Point 1503 on the Thalipuzha.
(*e*) Path from Point 1503 on the Thalipuzha to Pulimunda.
(*f*) Path from Meenmutty to Pulimunda, via the North bank of the Karumpuzha.

When working commences in the vicinity of Meenmutty, and Point 1503 on the Thalipuzha, it is suggested that portions of paths (*d*) and (*e*) be realigned, as they are, in places, uncomfortably steep, even for walking without loads.

For inspecting gap regeneration, cheap inspection paths will be made, as required.

SECTION 2.—UTILIZATION OF THE PRODUCE.

109. *Timber.*—Some railway sleepers were converted and extracted departmentally from this tract in 1930–31. At the time of writing, a purchaser is working out selected logs and poles, on a small scale. These are the only timber operations which have been undertaken since the forest came into the possession of Government. It is recommended that future timber working should be by purchasers. Logs (round or squared) of the more valuable species can be extracted from the lower forests, but there is no doubt that the greater part of the timber to come out of the tract must be in hand-sawn form and in the upper areas the sizes will have to be limited to that of a load which two men can drag. Where it is possible to employ elephants or buffaloes for dragging, to the cart-roads, the

requirements of the market can be more fully met. Every effort should be made to extract and sell as many species as possible, in the form the market requires. Apart from logs from the lower areas, the following are some of the likely forms of hand-sawn timber for which a demand may arise :—

(a) *Sleepers*, of *Teak*, *Xylia xylocarpa*, *Hopea parviflora*, and *Mesua* ferrea.

(b) *Cigar-box sizes* (8′ × 7″ × 5″) of *Cedrela toona*.

(c) *Vittams*, of *Terminalia paniculata*.

(d) *Kolmarams*, of *Acrocarpus fraxinifolius*.

(e) *Planks*, of *Rosewood*, *Artocarpus hirsuta*, and *Dysoxylum malabaricum*.

110. *Canes*.—The canes are dragged or carried to the nearest cart-road, whence they are taken mainly to Tellicherry and Mahé, and utilized for rattan, and for walking sticks. The best of the latter are exported to Europe.

111. *Bamboos*.—The only demands on these forests for bamboos in the past have been for use in floating timber, and it is unlikely that they will be required for other purposes in the future.

SECTION 3.—BUILDINGS.

112. *New buildings required*.—When work proceeds up the Thalipuzha Valley, an inspection shed should be constructed, on a suitable site, at about 2,000 feet elevation. An inspection shed like that on Arson Hill, with an elephant trench, would cost about Rs. 800. But if the working of the forests is turning out to be more profitable than can be anticipated at present, a more permanent and commodious type of building might be constructed at a cost of Rs. 2,000 to Rs. 3,000.

113. *Completion of inspection shed*.—The inspection shed on Arson Hill should be completed not later than the end of 1936–37, by replacing the tatti walls by plank walls, at a cost of about Rs. 100.

114. *Repairs*.—The serambi at Meenmutty, the inspection shed on Arson Hill, and the inspection shed proposed in paragraph 112, when constructed, will be repaired, as required. The surroundings of all buildings must be kept cleared, and where there are elephant trenches, these must be kept in repair.

115. *Temporary sheds*.—Sheds for subordinates, and coolie lines, of a temporary nature, will be required in the locality of operations when work commences. They will be built as required. In the interests of health, their surroundings should be kept clear of growth, during occupation, to a radius of at least fifty yards.

SECTION 4.—FIRE PROTECTION.

116. *General protection against fire*.—No special measures such as fire-lines, or early burning, are required in this tract. But coolies working in the area, and collectors of minor produce (mainly the Shola Naickens) must be warned against setting fire, and an example should be made of offenders. The upper margins of the Sholas are damaged, from time to time, by grass fires spreading down from the tops of the Nilgiris. This can only be controlled in the Nilgiris district, and complaints, in this regard, should be brought to the notice of the District Forest Officer, the Nilgiris.

SECTION 5.—RESEARCH AND EXPERIMENTS.

117. *Regeneration of evergreen forests before felling*.—These hill forests have to be maintained as protection forests, and therefore can only be regenerated under a shelter-wood. The selection system is suitable at present, but in the event of an increase in the number of species required by the market, a silvicultural system allowing of more concentrated fellings would be preferable. With this object in view, an experiment to induce and establish natural regeneration of valuable species *before* felling should be conducted. The Provincial Silviculturist should be consulted. These experiments will include a study of the effect of the admission of more light to existing natural regeneration of valuable species under trees to be removed in the next felling cycle. They will be done in the vicinity of at least ten trees in each annual coupe, and if the area under treatment contains suitable patches of natural regeneration of *Mesua ferrea* or *Hopea parviflora* light will be admitted to a few of these by the removal of the middle storey.

118. *Palaquium ellipticum*.—By far the most common tree in these evergreen forests is *Palaquium ellipticum*. Owing to remoteness, it is not sufficiently valuable, at present, to contemplate its extraction. But if its value increases sufficiently, concentrated fellings would be desirable. Its natural regeneration, in the seedling stage, is often prolific. An experiment should be conducted to ascertain what treatment of the overwood is necessary to get the seedling regeneration up to the pole stage. If this stage could be reached, all

marketable trees in the overwood could be felled without impairing the protective value of the forest. The Provincial Silviculturist should be asked to conduct an experiment. If he is unable to do so, he will, at least, offer advice. A suitable plot can be selected near the Meenmutty serambi. The experiment should include a study of the effect of admitting light much more courageously than has been our usual practice in the past.

119. *Fencing concentrated regeneration.*—At the end of paragraph 94, investigation of the effects and value of a fence round a portion of the annual 5-acre plot has been prescribed. One acre, should be fenced in the area regenerated in 1937–38. Fencing must be done before regeneration commences. Inside and outside the fence, both *Artocarpus hirsuta*, and *Swietenia macrophylla* should form a portion of the crop, since these two species are probably the most affected by animals. The fencing used should be woven wire (" Tightlock " pattern) and should be fastened to existing trees, wherever possible, where posts have to be used, they should be of species which resist white-ants. The original cost of fencing an acre will be about Rs. 25. But the wire can be moved, and probably used three times in all, which would make the cost less than Rs. 10 per acre. The effect of fencing should be noted for two years, by comparison of progress inside and outside the fence, and should the difference in favour of the fenced area be very great, the management must consider fencing all plots of concentrated regeneration thereafter.

SECTION 6.—CONTROL.

120. *Control Book.*—A Control Book for the timber-fellings, and another for the extraction of canes have already been prescribed, see paragraphs 96 and 101. Forms with sample entries are shown in Appendix A.

121. *Regeneration Ledger.*—A Regeneration Ledger has been prescribed, see paragraph 96. In view of this separate record, regeneration operations will not be recorded in the Record of Works—see Appendix A for the forms and sample entries.

122. *Control Maps.*—Progress of felling and of gap regeneration will be noted in the coupe-maps prescribed in paragraph 84. Maps of concentrated regeneration areas have been prescribed in paragraphs 94 and 97.

123. *Record of Works.*—The Record of Works will be maintained for the working plan area as a whole, and not separately for working circles. It will be an annual record of all works carried out in the tract, excepting, marking, felling and extraction of timber (including climber-cutting) and regeneration operations. The form to be used, and sample entries, are given in Appendix A.

124. *Control Journal.*—A Control Journal for the whole working plan area will be maintained as prescribed in the Madras Forest Department and Account Code.

125. *Register of Deviations.*—A register will be maintained for recording the deviations from the prescriptions of the working plan. It will contain a very brief description of the deviations, with reasons, and a reference to the orders of the Chief Conservator of Forests conveying sanction.

126. *Posting of control forms and submission to Conservator.*—All the control records, with the exception of the Control Journal, will be posted annually, as soon as possible after the close of the year. The Control Journal will be posted from time to time throughout the year, mainly from observations made in the field by the District Forest Officer. Copies of the entries made in all the control forms, for each year, will be submitted in duplicate to the Conservator of Forests, not later than the 15th August following the year to which they relate. The coupe map need not be submitted to the Conservator of Forests since it is susceptible neither to his criticism nor check, except during his inspections in the field.

CHAPTER VI.—ESTABLISHMENT AND LABOUR.

127. *Establishment.*—It is expected that the work which will be done in this tract during the period of the working plan will be within the supervising capacity of the ordinary staff of the Amarampalam range. Should there arise an unexpected increase in the demand for timber from these remote localities, proposals for the necessary additional staff will be made by the management.

128. *Labour.*—There is no labour resident in the tract. All coolies have to be imported, and they camp near their work for ten days to a fortnight at a time, and then return to their homes in the plains, or to Nilambur, for a rest and change. Camp sheds must be built for the coolies, and the surroundings of the sheds kept cleared. Quinine and other medicines should be supplied departmentally to the labour force. For ordinary works, coolies come from the vicinity of Karulai (the head-quarters of the Amarampalam range). For road making, these coolies can be supplemented by a small colony of Woddars which has settled in Wandur. Axemen, sawyers and carpenters come from various parts of the Ernad and Walluvanad taluks, and, in the case of sawyers, sometimes from Trichur and its neighbourhood in the Cochin State.

CHAPTER VII.—FINANCIAL FORECAST AND COST OF THE WORKING PLAN.

SECTION 1.—FINANCIAL FORECAST.

129. *Revenue.*—At the time of writing, the timber market is in a depressed state, but there are signs that the end of the slump is approaching and an increase in demand and possibly in prices, must be anticipated. At the same time, most of the forests in this tract are remote, and extraction of timber is difficult and costly, so that a large margin of profit can never be expected. The working of timber is, at present, purely experimental, and an estimate of what is likely to be extracted in the period of the working plan can be nothing better than a shot in the dark. Taking what it is hoped will prove to be a pessimistic view, it is estimated that 4,000 trees will be sold in the working plan period, and that the average profit will be Rs. 5 per tree. Working by purchasers is recommended. But if timber is worked by the department, the same profit should be assumed. The total net revenue from timber is therefore estimated at Rs. 20,000.

The revenue from canes is less a matter for conjecture, since canes have been leased in the past. Canes will be leased three times in the working plan period, and the total revenue from these leases is estimated at Rs. 3,500.

The total revenue from the tract, during the working plan period is therefore estimated at Rs. 23,500.

130. *Expenditure.*—The expenditure during the working plan period will depend, almost entirely, on the extent to which it is found possible to work timber at a profit, since road-making will not proceed in advance of expected extraction, and gap regeneration depends on the number of trees felled. To be on the safe side, however, provision will be made for constructing all the roads and buildings proposed in paragraphs 104 and 112, before the end of the period. The following is the estimate of expenditure; it does not include anything for felling and extraction of timber, since the revenue from timber is shown in the form of profit :—

	RS.
(*a*) Marking for felling (including climber cutting)	400
(*b*) Artificial regeneration of 1,000 gaps at Re. 1 per gap ...	1,000
(*c*) Concentrated artificial regeneration near roads	1,000
(*d*) Construction of and repairs to roads—see paragraphs 104 and 105	7,000
(*e*) Construction of main drag paths	400
(*f*) Construction and maintenance of foot paths	1,200
(*g*) Construction of and repairs to buildings—see paragraphs 112 to 115	1,500
(*h*) Transport and erection of wire ropes and pulleys	400
(*i*) Experiments	100
Total ...	13,000

131. *Estimated profit.*—The estimated profit for the working plan period is Rs. 10,500 should this pessimistic forecast prove to be justified, the tract is obviously not worth working, as a commercial proposition, *in the first felling cycle.* But the prescriptions aim at increasing the value of the forest particularly in its least inaccessible parts so as to make it a paying concern in the future, and with this object in view the working plan deserves a determined trial.

SECTION 2.—COST OF THE WORKING PLAN.

132. *Expenditure on enumeration and survey.*—The expenditure incurred under the Logging Engineer, in connexion with enumeration and survey, has been abstracted from the cash books of the officers and rangers working under the Logging Engineer. There has been some difficulty in deducting the expenditure in connexion with the "Log Cabin," possibly due to the unfamiliarity of the Working Plan Officer with the methods of accounting in the Logging Engineer's branch, with consequent inclusion, with the "Log Cabin," of items which should have been charged to other activities. The Working Plan Officer calculates the cost of the Log Cabin to be Rs. 2,299-5-11, whereas the Logging Engineer puts the figure at Rs. 1,823-7-6. The latter figure is adopted in striking the total debitable to the Working Plan. No charge has been made on account of the pay and travelling allowances of the Logging Engineer himself, since details are not available, but an addition of Rs. 20,000 on this account would probably be a conservative estimate.

133. *Details of expenditure under the Logging Engineer*—

Item.	Amount. RS.	A.	P.
Pay of officers	17,375	0	0
Travelling allowances of officers	6,733	9	0
Pay of Rangers	16,544	5	0
Travelling allowance of Rangers	5,438	3	0
Pay of Foresters	23,386	11	0
Travelling allowances of Foresters	4,059	6	0
Pay of surveyor	3,150	0	0
Travelling allowances of surveyor	1,403	15	0
Pay of peon to surveyor	933	0	0
Travelling allowances of peon to surveyor	469	14	0
Pay of clerks	869	6	0
Travelling allowances of clerks	271	8	0
Pay of peons to officers	493	13	0
Travelling allowances of peons to officers	421	3	0
Service stamps	100	3	0
Mosquito nets	266	1	0
Uniforms, clothing, blankets	331	0	0
Materials for, and construction of, sheds	851	6	0
Purchase and repair of tents	396	4	9
Transport of tents	250	0	0
Purchase and repairs of survey instruments	27	3	6
Transport of records, stationery, medicines, muskets, etc.	402	11	9
Purchase of photographic materials	18	11	0
Purchase of record-boxes, lantern, etc.	31	6	0
Tapal coolies, purchase of tapal bags, etc.	143	1	0
Money order commission on pay, etc.	5	0	0
Cooly wages for survey, enumeration, etc.	23,239	6	0
Expenditure in connexion with " Log Cabin " (Working Plan Officer's figures)	2,299	5	11
Total ...	1,09,911	8	11
Deduct cost of " Log Cabin " acording to Logging Engineer	1,823	7	6
Total cost of enumeration, survey, etc.	1,08,088	1	5

134. *Expenditure on preparation of Working Plan.*—As the Working Plan Officer had to prepare the plan in addition to his other duties, firstly as District Forest Officer, Nilambur, and later as District Forest Officer, the Nilgiris, the only charge on account of pay of officers is for the month of May 1932, during which time he was attached to the Working Plans Circle, without other duties. The details of expenditure by the Working Plan Officer are as follow :—

Item.	Amount. RS.	A.	P.
Pay of Working Plan Officer for May 1932	850	0	0
Travelling allowances of Working Plan Officer, 1929–30 to 1931–32	1,074	3	0
Pay of Ranger	100	0	0
Travelling allowances of ranger and subordinates ...	32	1	0
Transport of records, etc.	87	8	0
Construction of sheds	47	11	0
Wages of coolies engaged in field work	120	4	6
Total ...	2,311	11	6

135. *Total cost of the Working Plan.*—The total cost of the working plan may be estimated at Rs. 1,30,000 as follows :—

	RS.	A.	P.
Expenditure under the Logging Engineer	1,08,088	1	5
Estimated share of pay and travelling allowances of Logging Engineer	20,000	0	0
Expenditure by the Working Plans Officer	2,311	11	6
Total ...	1,30,399	12	11
	or		
	1,30,000	0	0

Summary of prescriptions.

Selection Working Circle.

		Number of paragraph in the working plan.
1	*Silvicultural system.*—Selection system	78
2	*Choice of species.*—Mainly natural. Species chosen for artificial regeneration are :—Teak, *Artocarpus hirsuta, Hopea parviflora, Cedrela toona, Swietenia macrophylla* and *Chickrassia tabularis*	79
3	*Exploitable size.*—Poon (*Calophyllum* spp.) 4 ft. girth, *Xylia xylocarpa,* 5 ft. girth, other species, 6 ft. girth, at breast height ..	80
4	*Felling cycle.*—Not less than 13 years	81
5	*Coupes.*—Not to exceed the size of a compartment, except to make up arrears	82
6	*Agency of exploitation and sale of timber.*—If possible by purchasers.	83
7	*Coupe maps.*—To be prepared on large scale and to show position of all trees marked for extraction, gaps chosen for artificial regeneration and paths	84
8	*Marking for felling.*—Detailed directions given	85
9	*Felling.*—To be done with least possible damage. Big gaps, if possible, in semi-deciduous forest	86
10	*Conversion.*—Timber to be converted to suit the demands of market, as far as possible. Avoid damage and wastage	87
11	*Accounting and check.*—Usual rules	88
12	*Extraction.*—Suitable drag paths to be made. Wire ropes for taking timber across main streams	89
13	*Artificial regeneration of gaps in semi-deciduous forest.*—Only in gaps of over 400 square yards in area which do not contain enough good species. Teak and *Hopea parviflora* to be raised and tended ..	92
14	*Tending of natural regeneration in gaps.*—All natural regeneration of valuable species to be tended in all gaps	93
15	*Concentrated artificial regeneration near roads in semi-deciduous forest.*—Five acres a year to be regenerated, with species chosen from teak, *Hopea parviflora, Swietenia macrophylla, Artocarpus hirsuta, Cedrela toona* and *Chickrassia tabularis*	94
16	*Climber cutting.*—When marking for selection felling and in gaps ..	95
17	*Control.*—Control Book, Regeneration Ledger, maps, instructions given	96 and 97

Minor Produce Working Circle.

18	*General lease of minor produce.*—Minor produce, excluding canes, to be leased under working plan for the valley	99
19	*Lease of canes.*—Canes to be worked once departmentally. Otherwise leased to purchasers. Rotation four years	100
20	*Control.*—Control Book for revenue and expenditure	101

Bamboo Working Circle.

21	*Prescriptions.*—Bamboos to be worked under the valley working plan	103

MISCELLANEOUS REGULATIONS.

		Number of paragraph in the Working Plan.
22	*Roads.*—Two new roads to be constructed when required. Cost about Rs. 6,100. Repairs as required	104 and 105
23	*Drag paths.*—To be made as and when required	106
24	*Wire ropes at stream crossings.*—Suggested for transport of timber across main streams	107
25	*Foot-paths.*—Existing foot-paths to be cleared annually. Realignment in places. New inspection paths as necessary	108
26	*Utilization of timber.*—Suggestions relating to logs, poles, and hand-sawn sizes	109
27	*Buildings.*—One new rest house in Thalipuzha valley proposed. Completion of inspection shed on Arson Hill prescribed. Repairs and temporary sheds provided for	112 to 115
28	*Fire-protection.*—Only general protection necessary	116
29	*Experiments.*—Prescriptions made for experiments in regenerating shola forests, naturally before felling, and investigating the desirability of fencing plots of concentrated artificial regeneration ..	117 to 119
30	*Control.*—Detailed instructions regarding Control Book, Regeneration Ledger, Control maps, Record of works, Control Journal, and Register of Deviations	120 to 126

APPENDICES.

The following are the appendices to this Working Plan :—

(i) Appendix A—Sample of control forms } Printed with the Working Plan.
(ii) Appendix B—Working Plan map, scale 2 inches to 1 mile. } Printed with the Working Plan.
(iii) Appendix C—A set of maps, scale 1 inch to 300 feet.

One for each of the compartments 1 to 12, showing sub-compartments, and the estimated stock of valuable species—Not printed.

APPENDIX A.

SAMPLES OF CONTROL FORMS.

CONTROL BOOK.

Selection Working Circle.

Fellings carried out.

Year.	Compartment.	Coupe.	Area worked in acres.	Agency of felling.	Species.	Number of trees felled.	Outturn of timber extracted in log form. Number of logs.	Outturn of timber extracted in log form. Volume in c.ft.	Outturn extracted as sawn timber. Description and number of pieces.	Outturn extracted as sawn timber. Volume in c.ft.	Revenue realized. RS. A.	Expenditure incurred including cost of enumeration. RS. A. P.
1937–38	1 (part)	1	653	Purchaser.	Tectona grandis.	6	9	293	..	..	73 4	
					Xylia–Xylocarpa.	421	..	..	B.G. sleepers 1660	5,187·5	1,660 0	22 7 0 (Enumeration) and climber cutting only.
									M.G. sleepers 820	1,230·0	256 4	
									Total ..		1,989 8	
1938–39	1 (part)	II										

CONTROL BOOK.

Minor Produce Working Circle.

Period of working.	Agency of working.	Outturn in numbers.	Revenue realized. RS. A. P.	Expenditure incurred. RS. A. P.	Profit. RS. A. P.	Remarks.
1st April 1939 to 31st March 1940.	Departmental	720,350 canes.	2,350 0 0	1,046 7 0	1,303 9 0	Sold in auction at Nilambur Railway depot.
1st April 1943 to 31st March 1944.	Purchaser ..	646,280 canes.	1,160 0 0	..	1,160 0 0	

RECORD OF WORKS (MISCELLANEOUS).

A. Measures prescribed,

Prescriptions of working plan. Year.	Description of work.	Paragraph number in working plan.	Operations carried out. Year.	Description of work.	Cost. RS. A. P.
1937–38 ..	1 Clearing the six foot paths prescribed in paragraph 108.	108	1937–38 ..	1 Clearing six foot paths as follows— (a) Valiathodu to Arson Hill, etc.	67 6 0
	2 Completion of inspection shed on Arson Hill.	113	,,	2 Preparing and fixing plank walls in inspection shed on Arson Hill.	96 4 0
Not prescribed.	3 Construction of camp sheds.	..	,,	3 Construction of bamboo and grass sheds, for subordinates and coolies 1 shed of 15′ × 10′, 1 shed of 60′ × 10′.	58 6 0
				Total, 1936–37 ..	222 0 0

B. Measures suggested.

C. Measures neither prescribed nor suggested but carried out.

Note—1. Artificial regeneration is controlled in the Regeneration Ledger only.
2. Climber cutting is included with enmeration, in the Control Book.

Nil.—8

REGENERATION LEDGER.

Selection Working Circle.

A.

Gap Regeneration.

1. Number and area of coupe, and year of commencing regeneration.	Coupe 1, 1938–39.
2. Area of coupe (map enclosed)	653 acres.
3. Total number of gaps in the coupe	427.
4. Total number of gaps regenerated	116.
5. Total number of patches regenerated, by species ..	Teak 2,200. Hopea parviflora
6. Total number of natural seedings and saplings staked, by species	Xylia xylocarpa .. .. 2,864; Dalbergia latifolia .. .. 1,543; Teak 387; 179
	Total cost .. 2,109

7. Dates and costs of :—

	Dates.	Cost. RS.	A.	P.
(*a*) Burning	20th to 24th February 1938 ..	5	6	0
(*b*) Staking and soil preparation	25th to 29th April 1938	9	4	0
(*c*) Sowing (cost to include seed)	4th June 1938 ..	11	4	0
(*d*) Planting (cost to include seed nursery, etc.) ..	9th April 1938	17	2	0
(*e*) Weeding in first year	28th and 29th September 1938 ..	41	6	0
(*f*) Weeding in second year	8th May 1939	18	7	0
(*g*) Replacement of casualties in second year (cost to include seed, nursery, etc)	2nd June 1939 (Hopea)	4	3	0
	Total cost	107	0	0

Details of gaps.

Serial number of gap.	Number of natural seedlings or saplings staked, by species.		Number of patches regenerated by species.		Number and percentage of successful patches, by species, after: First hot weather after formation.		Second hot weather after formation.	
1.	Teak	3	Teak	16	Teak ..	16 (100 per cent).	Teak ..	16 (100 per cent).
	Xylia xylocarpa.	11	Hopea parviflora.	25	Hopea parviflora. ..	20 (80 per cent).	Hopea parviflora. ..	20 (80 per cent).
	Total ..	14	Total ..	41				

REGENERATION LEDGER.

Selection Working Circle.

B.

Concentrated artificial regeneration near roads.

1. Year of commencing regeneration	1937–38.
2. Name of road or path, and location of regeneration area	Mancheri road, South side, between miles 2–6 and 2–7.
3. Number of patches regenerated by species ..	Teak 50. Hopea parviflora, 3,000.

4. Dates and costs of :—

	Dates.	Cost. RS.	A.	P.
(*a*) Burning	26th February 1937	0	9	0
(*b*) Staking and soil preparation	28th to 30th April 1937	13	12	0
(*c*) Sowing, including cost of seed	30th May 1937 (Hopea)	25	4	0
(*d*) Planting, including cost of stumps	16th April 1937 (Teak stumps) ..	0	10	0
(*e*) Weeding in first year	20th September 1937 (Teak and Hopea)	38	6	0
(*f*) Weeding in second year	11th May 1938 (Teak only) ..	0	9	0
(*g*) Replacement of casualties in second year, including cost of seed	3rd June 1938 (Hopea)	3	8	0
	Total cost	82	10	0

5. Number and percentage of successful patches after first hot weather, by species	Teak, 47 (94 per cent). Hopea, 2,000 (67 per cent).
6. Number and percentage of successful patches after second hot weather, by species	Hopea 2,600 (87 per cent). Teak, 718 (96 per cent).

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Proceedings of the Chief Conservator of Forests

Proceedings No. 298, Press, 15th July 1936

Working Plan—Nilambur Hills—Sanctioned.

T. A. Whitehead, Esq., I.F.S.,
Acting, Chief Conservator of Forests.

Read—the following papers :—

Letter from the District Forest Officer, The Nilgiris, dated 29th November 1935.

Endorsement of the Conservator of Forests, Working Plans Circle, No. A. 151/31, dated 2nd February 1936.

Chief Conservator's Referance No. 7827/34–C-2, dated 18th March 1936.

Working Plans Conservator's No. A. 151–31, dated 24th March 1936 and 1st July 1936.

Proceedings—No. 298, Press, dated 15th July 1936.

Sanctioned.

T. A. Whitehead,
Acting. Chief Conservator of Forests.

(True copy)

M. F. Bridge,
Personal Assistant.

To the Conservator of Forests, Ootacamund Circle.
,, Conservator of Forests, Working Plans Circle, with a copy of the working plan returned.
,, Collector, Malabar, Calicut.

Copy to other Conservators of Forests ,, all District Forest Officers ,, the Principal, Madras Forest College ,, the Provincial Sylviculturist ,, the Working Plans Officers ,, the President, Forest Research Institute, Dehra Dun	Press-copy.

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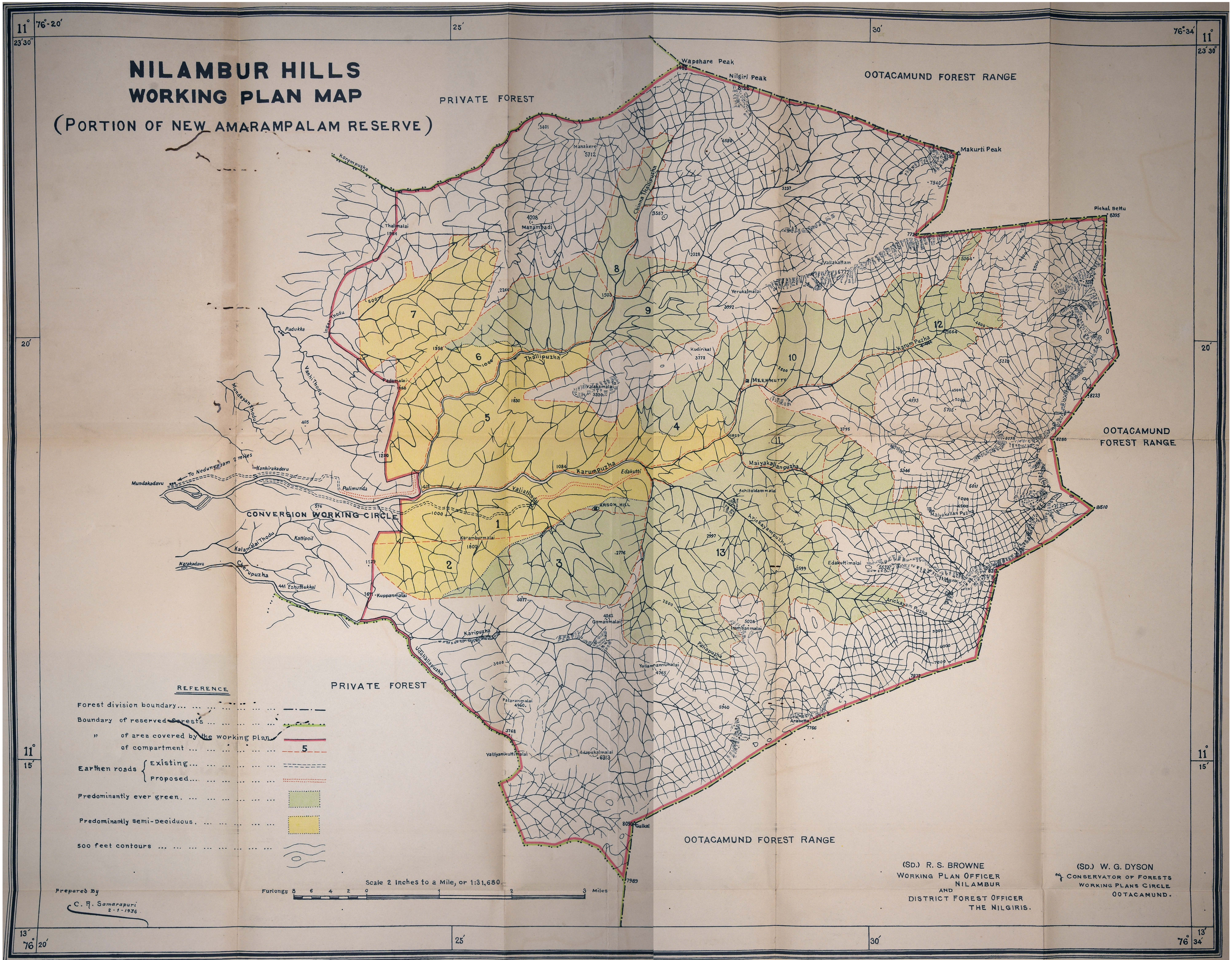
N36



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